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Model Curriculum for Training Tractor-Trailer Drivers

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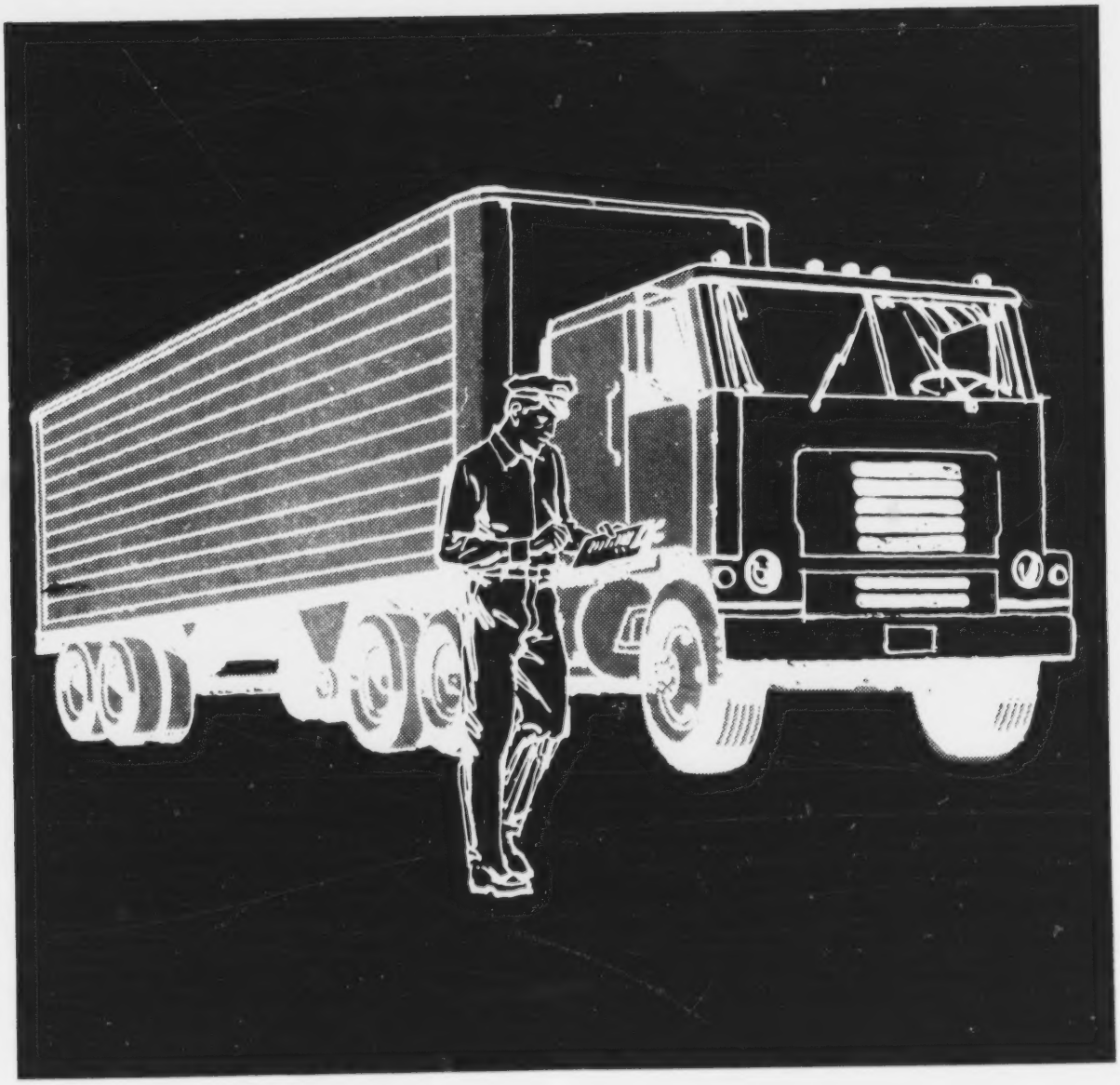
Administrator's Manual



US Department of Transportation
Federal Highway Administration

TD 2.308:

Model Curriculum for Training Tractor-Trailer Drivers

Administrator's Manual

U.S. Department of Transportation
Federal Highway Administration

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Model Curriculum for Training Tractor-Trailer Drivers

Bureau of Motor Carrier Safety

1985

Administrator's Manual

U.S. Department of Transportation
Federal Highway Administration

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ADMINISTRATOR'S MANUAL

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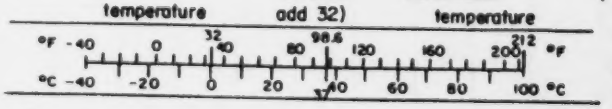
METRIC CONVERSION FACTORS

APPROXIMATE CONVERSIONS FROM METRIC MEASURES

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
	LENGTH			
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.6	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons(2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

APPROXIMATE CONVERSIONS FROM METRIC MEASURES

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares(10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	36	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



Notes:

INTRODUCTION

This School Administrator's Manual is part of the U.S. Department of Transportation's, Federal Highway Administration's, Bureau of Motor Carrier Safety (BMCS) Model Curriculum For Training Tractor-Trailer Drivers, hereafter referred to as the "Curriculum." The Curriculum also includes a Student Manual and an Instructor's Manual, contents of these three manuals are based upon the BMCS Proposed Minimum Standards For Training Tractor-Trailer Drivers, hereafter referred to as the "BMCS Standards." The objectives, content, methods, instructional times, materials, equipment and facilities specified in this Curriculum are in full compliance with the BMCS Standards and may be used as a guide to better comprehension of both the requirements and "spirit" of the BMCS Standards.

It should be emphasized that the BMCS Standards are minimum standards, therefore, this curriculum is to be considered a basic or "core type" of curriculum. Graduates of this Curriculum cannot be considered fully trained, "ready to solo" type drivers. This can only be accomplished if the Curriculum is considerably expanded and enriched to provide both additional driving time and material pertinent to the particular driving job that the student is being trained for. Students graduating from this basic Curriculum will still need additional road experience and vocational type of training: (such as loading tankers, chaining down loads, etc.) under the guidance and supervision of an experienced, professional driver before being considered fully qualified to operate in interstate or foreign commerce (as required by Section 391 of the Federal Motor Carrier Safety Regulations).

How much additional experience, will obviously depend upon the individual's capacity to learn; how much the school expands/enhances the basic Curriculum; and the quality of instruction. Therefore, all schools are urged to carefully evaluate the specific job requirements that their students are being trained for and to add all necessary material to this Curriculum to enable the student to successfully meet those job requirements safely.

The Curriculum manuals have been placed in three ring binders to facilitate future updating as well as to enable schools to expand upon and/or enrich the materials herein.

Overview of the Curriculum

The four basic goals of this Curriculum are the same as those of the BMCS Standards, which are

- Student safety (while in training)
- Ability to drive safely (reduced collision potential)
- Ability to drive legally (compliance with laws and regulations)
- Ability to drive efficiently (reduced fuel consumption and vehicle abuse)

This manual addresses those aspects of school administration that are affected by the specific requirements of the Curriculum. It provides a brief description of the Curriculum in itself, along with requirements imposed by the need for highly qualified instructors, for suitable equipment, materials, and facilities, and for procedures to assure the qualifications of students graduating from the course.

Organization of Manual

Requirements for administration of the Curriculum are discussed in the following sections, making up the contents of this manual:

- Introduction
- Curriculum Description
- Sample Training Schedules
- Instructor Selection
- Instructor Training
- Instructor Supervision
- Instructor Assignment
- Training Equipment and Materials
- Training Aids and List of Sources
- School Facilities
- Student Recruitment
- Student Selection
- Student Files
- Recording Student Performance
- In-Course and Final Examinations
- Graduation
- Placement
- Glossary and List of Abbreviations Used in the Curriculum

Curriculum Materials

The Curriculum is documented in the following materials:

Instructor Manual--A set of lesson plans providing detailed instruction in administration of classroom, lab, range, and street lessons.

Student Manual--A manual containing materials needed by students for successful instruction.

Visuals--Hard copy that can be made into transparencies required in classroom instruction.

Test System--A set of written, range and street tests designed to assess attainment of the Curriculum objectives.

Each of these materials is described in further detail in the next section of this Manual entitled "Curriculum Description."

CURRICULUM DESCRIPTION

This section will provide a general description of the Tractor-Trailer Driver Curriculum, including an overview of the Curriculum, a description of its key components: the Instructor Manual, Student Manual, Visuals, and summary of each of its instructional units.

OVERVIEW

Purpose

The Curriculum prescribes a complete instructional program for training of novice tractor-trailer drivers. Its purpose is to aid schools in providing courses that are comprehensive in developing all the competencies required to operate a tractor-trailer. The Curriculum also fulfills the Bureau of Motor Carrier Safety's **Proposed Minimum Standards for Training Tractor-Trailer Drivers.**

NOTE: It is extremely important for all school owners and/or school administrators to carefully review the B.M.C.S. Standards prior to using this Curriculum to fully understand the goals and to determine what material/lessons are optional, which are not and what the alternatives are.

Organization

An outline of the Curriculum appears on the following page. The Curriculum is organized into five major sections of instruction. Each section contains from three to nine instructional units, each unit contains one or more lessons. Lessons are categorized by the type of instructional activity:

Classroom Lessons--Instruction that takes place indoors accompanied by instructional aids.

Lab Lessons-Instruction that takes place outside the classroom but does not involve student operation of a vehicle.

Range Lessons--Behind-the-wheel instruction that occurs in a protected off-street area.

Street lessons--Behind-the-wheel instruction that take place under roadway and traffic conditions.

Instructional Hours

The instructional hours appearing in the outline on the next page meet the minimum requirements of the BMCS Standards. These are, however, only estimates based on the requirements of the topics or activities included. As previously stated, this is only meant to be a "core type" minimum curriculum, hence there are many variables which will affect the actual

CURRICULUM OUTLINE

	HOURS				
SECTION 1 - BASIC OPERATION	CLASSROOM	LAB	RANGE	STREET	TOTAL
Unit 1.1 - Orientation	2	1	0	0	3
Unit 1.2 - Control Systems	1	.5	0	0	1.5
Unit 1.3 - Vehicle Inspection	1.5	4	0	0	5.5
Unit 1.4 - Basic Control	.5	0	6.5	0	7
Unit 1.5 - Shifting	1	0	3	0	4
Unit 1.6 - Backing	.5	0	16	0	16.5
Unit 1.7 - Coupling and Uncoupling	.5	3.5	0	0	4
Unit 1.8 - Proficiency Development: Basic Control	.5	0	36	6	42.5
Unit 1.9 - Special Rigs	1	4	0	0	5
	8.5	13	61.5	6	89
SECTION 2 - SAFE OPERATING PRACTICES					
Unit 2.1 - Visual Search	1	.5	0	7.5	9
Unit 2.2 - Communication	1	0	0	3	4
Unit 2.3 - Speed Management	1.5	.5	0	0	2
Unit 2.4 - Space Management	1	0	0	6	7
Unit 2.5 - Night Operation	.5	0	2	3	5.5
Unit 2.6 - Extreme Driving Conditions	2	0	1	0	2
Unit 2.7 - Proficiency Development: Safe Operating Procedures	1	0	0	60	61
	8	1	2	79.5	90.5
SECTION 3 - ADVANCED OPERATING PRACTICES					
Unit 3.1 - Hazard Perception	1	0	0	6	7
Unit 3.2 - Emergency Maneuvers	1	0	4	0	5
Unit 3.3 - Skid Control and Recovery	1	0	4	0	5
	3	0	8	6	17
SECTION 4 - VEHICLE MAINTENANCE					
Unit 4.1 - Vehicle Systems	10.5	2	0	0	12.5
Unit 4.2 - Preventive Maintenance & Servicing	.5	3	0	0	3.5
Unit 4.3 - Trouble-Shooting and Emergency Repairs	2	.5	0	0	2.5
	13	5.5	0	0	18.5
SECTION 5 - NONVEHICLE ACTIVITIES					
Unit 5.1 - Handling Cargo	3	3.5	0	0	6.5
Unit 5.2 - Cargo Documentation	2	0	0	0	2
Unit 5.3 - Hours of Service Requirements	4.5	0	0	0	4.5
Unit 5.4 - Accident Procedures	4	.5	0	0	4.5
Unit 5.5 - Personal Health and Safety	3.5	3	0	0	6.5
Unit 5.6 - Trip Planning	3	0	0	0	3
Unit 5.7 - Public & Employer Relations	2	0	0	0	2
	22	7	0	0	29
TOTAL	54.5	26.5	71.5	91.5	244

29 UNITS (MANDATORY) AND 72 LESSONS (OPTIONAL)
* = Portions of Time are Optional

hours required in any school's program of instruction, e.g., the goals of the school, the type of students and their learning ability, and the number and quality of instructors.

The total amount of time for Range and Street lessons (as shown in the outline), reflects a 3 to 1 student/vehicle ratio which is one of four permissable ratios under the BMCS Standards

Instructional Sequence

The units of instruction listed in the outline may be taught in any sequence that leads to efficient learning, provided the prerequisites for each unit are met. The first three sections form a natural learning sequence beginning with basic control of the vehicle's motion (Section 1), superimposing upon this activity the needs of the highway traffic environment (Section 2), and finally introducing the advanced skills (Section 3), that can only be acquired once the more fundamental skills have been mastered.

Units of Sections 4 and 5 are relatively independent and can be taught in any sequence because they involve primarily classroom and laboratory instruction, they may be scheduled concurrently with the BTW instruction of Sections 1-3 so as to make the fullest possible use of school equipment and facilities.

A suggested training schedule appears in a separate section entitled "Sample Training Schedules."

The most significant aspects of the Instructor Manual are the objectives of instruction, the methods employed to meet those objectives, and the format in which the methods are described.

THE INSTRUCTOR MANUAL

The primary purpose of the Instructor Manual is to provide guidance on how to conduct instruction in the classroom, lab, range, and the street. The Instructor Manual contains all the content needed for effective presentation of information/training by qualified instructors and effective behind-the-wheel instruction.

Objectives

Objectives of instruction are provided at the beginning of each Instructional Unit describe what it is the Unit is attempting to teach. They are not divided up among individual lessons since, in most cases, the various classroom, lab, range, and street lessons are all applied toward attainment of the same objectives.

Purpose of Objectives

The purpose of the objectives is to make explicit what the instruction of the unit is attempting to accomplish. The objectives described the performances that students are expected to be capable of following--unit instruction, as well as the knowledge, skills, and attitudes they must possess to attain performance objectives. The objectives are taken directly from the BMCS Standards that the instruction is intended to fulfill. Making the objectives explicit is intended to enable the instructor to

- gain a clear understanding of what the instruction must accomplish to fulfill training standards,
- be able to communicate to students what is expected of them, and
- be in a position to modify training to meet local needs and changing times while still complying with training standards.

Nature of Objectives

The objectives appearing in the Instructor Manual describe the "real world" performance, knowledges, skills and attitudes needed to assure safe operation of tractor-trailers. They are not to be confused with "behaviorial objectives" sometimes appearing in lesson plans that describe a system of measuring student achievement, e.g., "the student must describe "...."the student must be able to list...", etc. These behavioral objectives are inappropriate for use in the curriculum for the following reasons:

- There are many important curriculum objectives that cannot be measured within an instructional setting, including objectives concerned with alcohol, drugs, personal health, preventing fatigue, and actual use of safety practices, such as keeping log books, visual search practices and so on.
- Because it is not feasible to measure all aspects of instruction, behavioral objectives only sample from the instructional content. Listing only the sample of content to be measured fails to communicate a complete picture of the true objectives of instruction.
- Identifying the specific measures that will be used to assess student achievement allows students to concentrate their preparation specifically on those aspects of content to the neglect of others.
- Accurate measurement of student performance, knowledge, skill, and attitude requires far more precise definition of the conditions of measurement, performance to be observed, and criteria of proficiency than can be practically encompassed in a statement of objectives.

Since they do not adequately describe what is truly to be accomplished in training, behavioral objectives are not particularly useful in communicating to students, administrators, or anyone seeking to update or improve the training program. Nor are they very often used for measurement purposes. Most instructors assess student proficiencies through written and performance tests that bear little resemblance to the "behavioral objectives."

The following paragraphs describe the nature of objectives that appear in the curriculum, including performance, knowledge, skills, and attitude objectives.

Performance Objectives

Performance objectives specify the performances that students are expected to exhibit as a result of unit instruction. The nature of the Curriculum is such that students can be expected to exhibit "real world", tractor-trailer driving performance on the basis of unit instruction. Therefore, all unit performance objectives are "terminal" objectives. There is no need for intermediate objectives to serve as stepping stones to the attainment of higher objectives, a characteristic of training programs that deal with much more complex behavior.

Performance objectives may be divided into two types, called for the want of better terms, "enabling" and "assurance" objectives.

Enabling Objectives

One type of objective involves performances that students are not capable of carrying out prior to instruction and for which instruction plays an enabling roll. In the Instructor Manual, such objectives are introduced by the phrase "student must be able to."

- Students must be able to back into an alley dock.
- Students must be able to align the tractor properly to connect with the trailer.

Assurance Objectives

Many of the performances the Curriculum seeks are ones that students are capable of, but which for various reasons they often do not carry out. Here, the objective of instruction is primarily to assure that the performances are carried out. Such objectives are preceded by the phrase, "students must." For example:

- Students must cancel turn signals after the trailer is around the corner and straightened out.
- Students must adjust speed to configuration and condition of the roadway.

Knowledge Objectives

Knowledge objectives describe the information needed by students in order to meet performance objectives. Some forms of knowledge play an enabling role while others are intended to motivate. Knowledge objectives include the following:

Procedural Knowledge--The knowledge of steps used in carrying out certain performances.

Factual Knowledge--Specific items of factual information needed to carry out procedures, e.g., stopping distance, tire inflation, common hazards.

Conceptual Knowledge--Knowledge of relationships, e.g., the relationship between speed and stopping distance.

Examples of knowledge objectives concerned with shifting gears, include the following:

Students must know

- shifting procedures for transmissions to be taught.
- the instruments and controls necessary to shift gears properly.
- the shift patterns of all major conventional transmissions.
- common shifting errors and their consequences.

Skill Objectives

The mere possession of information is often not enough to insure that students can master performance objectives. Certain skills are also required. Skills objectives include the following:

Perceptual Skills--The ability to interpret complex patterns of stimuli, e.g., the ability to judge distance and closure in determining the acceptability of gaps in traffic.

Perceptual Motor Skills--The ability to couple sensory feedback and motor response, often involving two or more simultaneous responses in achieving a smooth overall performance, e.g., coordinating clutch, throttle, and gear shift getting a tractor-trailer underway.

Mental Skills--The ability to reason deductively or inductively, e.g., interpreting and applying hours of service regulations.

The descriptions of skill objectives attempt to identify these specific elements of skill. An example of the skill objective in support of backing follows:

- Students must be able to coordinate speed and direction control to achieve the desired path while backing.

One characteristic of skills is that they require practice for attainment of the objective. A major purpose in listing skill objectives is to call attention to those performances for which student practice must be provided in instruction.

Attitude Objectives

The acquisition of knowledge and skill does not assure adequate performance. Many students who are capable of performing do not do so for one reason or another. They must, in addition to having knowledge and skill, possess attitudes that are favorable to the performance. This is particularly true for those performances where the objective of instruction is that of assuring performance is carried out.

Much of the information that makes up knowledge objectives is concerned primarily with motivating students to perform. However, not all of the information will be believed by all students. Where differences in students beliefs are likely to exist, those beliefs that are sought by the instruction are specified as attitude objectives. An example of an attitude objective concerned with speed follows:

- Students must believe that driving proficiency cannot compensate for speed that is excessive for prevailing conditions.

Setting forth attitude objectives does not apply an assumption that students will hold the desired beliefs upon the completion of unit instruction. While knowledge and skill objectives will be attained in time, given the requisite aptitudes, many students will graduate without sharing the beliefs that are sought by the Curriculum. However, it can be assumed that changes in belief are more likely to be realized if they are made explicit objectives of training, than if they are excluded from the training objectives.

Methods of Instruction

The methods of instruction employed in the Curriculum will include presentation, demonstration, practice, problem solving, group discussion role playing and field trips.

Presentation

The largest portion of the Instructor Manual consists of guidance to instructors in presenting information during classroom lessons. Because it is the demanding form of instruction insofar as the instructor is concerned, the presentation requires the most detailed guidance of all of the methods employed. Therefore, while presentation makes up only about a quarter of the Curriculum, it accounts for the overwhelming majority of the guidance provided in the Instructor Manual.

In the Curriculum, the instructor bears the primary responsibility for presenting information. While the use of audio-visual presentations such as

videotape, slide/cassette or film is encouraged, the Curriculum does not rely on their use. The number and range of usable materials is too small, their cost too great, and their useful life span too short to dictate their use in the Curriculum.

"Presentation" is not equivalent to lecture. Instructors are expected to make the presentation of information as interactive as possible by calling upon students to react to what is presented, contribute their own experiences, and discuss the implications of what they are presented with among themselves.

Demonstration

When the students are called upon to perform an activity for the first time, they are generally given a preliminary demonstration by the instructor. Demonstration is most frequently used in Laboratory and Range instruction. The demonstrations are purposely kept brief so that the maximum time can be made available to the students to practice.

Student Practice

Most of the instruction making up the Curriculum consists of student practice carrying out the various performances that serve as the objective of training. The great majority of this practice is behind the wheel of the truck, either on- or off-street range, or on the street. Other major areas of practice include pre-trip inspection, coupling and uncoupling, servicing and maintenance, cargo handling, maintaining logs, preparing cargo documentation. All practice takes place under the supervision of an instructor who provides informational feedback on correct and incorrect performance.

Observation

Because practice involves direct interaction with the vehicle it can accommodate only one student at a time. And, since the number of students exceed the number of available vehicles, not all students can practice at the same time. The remainder can only observe.

Students who are not practicing must be actively engaged in the learning process if they are to benefit from observation and if the hours devoted it are to be counted as meeting training standards. A number of techniques are employed to keep observers actively involved in learning, including the use of checklists and critiques.

Problem-solving

Much of the classroom activity consists of exercises in which students apply information they have just learned to the solution of problems, including traffic problems, cargo handling problems, and so on. This activity differs from Practice in that it is basically a conceptual, paper-pencil exercise rather than a hands-on type experience.

Group Discussion

The attainment of attitude objectives often depends to a great extent upon peer acceptance of instruction as is provided. The group discussion can help foster peer acceptance. The instructor's role in group discussions is (1) raise issues to trigger discussion, (2) provide information to help clarify issues and avoid misconceptions, and (3) see that all students have an opportunity to participate.

Role Playing

Certain types of activities required of tractor-trailer drivers involve social interaction, including handling accidents, employment interviews, and dealing with customers. Role playing exercises are provided in the curriculum in order to give students simulated practice in carrying out the activities. The practice is intended to develop both skill and confidence. The latter is of particular importance in situations where anxiety is likely to be involved, e.g., accidents and employment situations. Allowing students to gain experience with the protective confines of the school helps to develop confidence and their ability to succeed.

Field Trips

The Curriculum calls for field trips to gain familiarity with tractor-trailer rigs not available at the school, and the actual operation of cargo handling operations. Because of the travel time involved and their marginal value in helping to obtain instructional objectives, the use of field trips is not mandatory. In fact, "optional" activities provided for in the curriculum, do not count toward meeting minimum hourly requirements of the BMCS Standards. However, schools are encouraged to give students the benefit of all optional type lessons in order to enhance their chances of success on the job.

Homework

The BMCS Standards permit the required hours of classroom instruction to be reduced through homework. The Curriculum does not, however, specifically call for homework assignments for the following reasons:

- Materials that are suitable and readily available could not be identified.
- Many schools cannot afford to provide suitable material.
- Many students cannot learn effectively through homework.

The fact that the Curriculum content does not specifically call for homework should not discourage schools from using it as an instructional method where appropriate materials are available and students are capable of participating in it.

Format

The format of the Instructor Manual consists of three elements:

- o Unit Introduction
- o Lesson Introduction
- o Lesson Plans

Unit Introduction

To introduce each unit, the following information is provided:

Title--The number and name of the unit.

Purpose--A brief statement of the overall purpose of the unit.

Objectives--Listing of the performance, knowledge, skill, and attitude objectives for the unit.

Content--A listing of the lessons making up the unit, along with the time allocated to each lesson.

Lesson Introduction

To introduce each lesson, the following information is provided:

Title--The number and name of the lesson.

Overview--A brief overview of the lesson including the time allotted to it, the prerequisite, and the purpose of the lesson. Prerequisites are confined only to the last unit(s) in the sequence leading up to the lesson, but not all of the units, that together comprise the prerequisites.

Materials--A listing of the instructional aids and portions of the student material that will be used during the lesson, as well as any other items of printed material or equipment required.

Activity/Topic--A listing of the activities and/or topics (in sequence) to be covered and the approximate amount of time necessary to cover each.

Lesson Plans

The bulk of the Instructor Manual consists of guidance in carrying out the instruction that makes up the curriculum. The format of the lesson plans varies according to the type of instructional activity: classroom, lab, range, and street.

Classroom Lesson Plans

Since classroom instruction consists largely of the same activity--presentation of information, guidance takes the form of an outline of the information to be presented. This outline is presented in the form of a heirarchy rather than a "laundry list" of information to be presented, in order to (1) communicate the logical sequence of information to the instructor and (2) permit instructors to move from detail content to subheadings and major headings as they become more familiar with the content of the lesson plan.

It is not uncommon in lesson plans to use a columnar format with separate columns for headings, detail guidance, and instructional aid. A columnar format tends to be very extravagant of space when the content of each of the columns is not equal. Reserving columns for headings and instructional aids would certainly have left a great deal of white space in the lesson plan format. While this might have enhanced the physical attractiveness, it would have also added greatly to the size and expense of the Instructor Manual.

Instead of a columnar format, the lesson plan uses bold type and underlines to make headings and instructional aids easy to identify. An illustrative sample of the format for classroom lesson plans appears below.

(Reprinted from Instructor's Manual
Unit 2.3 - Speed Management)

---

1. SPEED AND STOPPING DISTANCE (20 minutes)

Importance of Speed Management

Speeding Is Major Cause of Fatal Traffic Accidents

Definition of Speeding
- Exceeding legal or posted speed limit
- Driving too fast for conditions

Conditions for Adjusting Speed

Visual 1 Conditions Affecting Safe Speed

Four Conditions Affect Maximum Safe Speed

Traction
- Traction refers to the tire's grip on.
- Decreased traction means increased stopping distance.
- Adjust speed to conditions that decrease traction (slippery road).

Visibility

Must be able to stop within distance you can see
Adjust speed to conditions that interfere with visibility (rain, fog, snow, and darkness)

Traffic Conditions

Need to maintain a safe space cushion in traffic
Adjust speed to volume and flow of traffic to keep a safe cushion

Roadway Characteristics

Shape of road affects traction and visibility
Adjust speed for curves and hills

Vehicle speed is most critical factor in stopping distance

Two Parts of Stopping Distance

Braking Distance
Driver Response Time

Visual 2 Stopping Distance Chart

Braking Distance

Braking Distance A Function of:

Brake "lag" distance--the distance the vehicle travels during the time it takes the compressed air to reach the individual brake chambers

---

(End - Instructor's Manual Sample)

The fact that the classroom lesson plans appear as an outline should **NOT** imply that classroom instruction consists simply of lecture. A high degree of interaction between instructor and students is necessary for effective learning. Guidance in providing interaction instruction is provided in two ways:

General--Procedures that encompass all or most lessons are provided in the Introduction to the Instructor Manual.

Specific--Instructions for activity that are specific to a particular lesson appear in the body of the lesson plan. Directions to the instructor are placed in parenthesis to distinguish them from the content outline.

Laboratory/Range Lesson Plans

Since lab and range instruction is devoted primarily to student practice, rather than presentation and discussion of information, the format must guide the instructor through the activities that make up the lesson

plan. Lab/street lessons are divided into a number of specific exercises. For each exercise the following guidance is given:

Purpose--A brief statement of the purpose of the particular activity.

Layout--Instructions for setting up the activity, including painting of lines, placing of traffic cones, positioning of vehicles, etc.

Directions--The specific activities of the instructor and student in carrying out the exercise.

Observations--The elements of student performance that the instructor observes to assist the students performance.

Evaluation--Any criteria employed to assess performance proficiency where it involves something more than simply the occurrence or nonoccurrence of observed performance (e.g., vehicle positions through a right turn).

Street Lesson Plans

Street lesson plans also are exercises, involving the instructors supervision of student activity. For each street exercise, the following guidance is provided:

Purpose--A brief statement of the purpose of the exercise being performed.

Route--Characteristics of the road, traffic, and roadside environment in which the exercise should take place.

Directions--Instructions to the instructor on directing the behavior of student drivers and observers, e.g., frequency of rotation between driving and observing, method of conducting critiques, use of check lists, and ancillary tasks (e.g., commentary driving, timing gaps).

Observations--The elements that the instructors must observe in assessing the performance.

Both directions and observations deal with activities of the student. The directions describe those activities that are carried out for the purpose of the exercise, while observations list the performances that make up the real world performance objectives of the course.

Level of Detail

It should be carefully noted that the guidance in the Instructor Manual is only intended to tell fully qualified instructors:

- What to teach.

- How to teach it.

It is not designed to communicate the content of instruction to instructors themselves. The Instructor Manual is not a teacher preparation guide or a text in tractor-trailer operation. Instructors must have met all of the instructional objectives themselves, before they are to be allowed to teach.

The guidance provided by the Instructor Manual is furnished in sufficient detail to make sure that the instruction given by the instructor is

Complete--Even qualified instructors may omit elements of instruction through oversight or the belief that they are unimportant.

Correct--Many tasks can be performed in different ways. Detail is needed to make sure that students are taught to carry out given tasks and the way that is considered to be the most correct.

Effective--Just as there are different ways of driving a truck, there are different ways of teaching. Sufficient details are provided to make sure instructors teach in the manner considered to be most effective.

Designing the Instructor Manual for use only by qualified teachers does not imply an assumption that all teachers engaged in training tractor-trailer drivers are fully qualified. The evidence is that many of them are not. However, it is not the role of the Instructor Manual to overcome their shortcomings. Any attempt to do so would result in a manual that was

- extremely voluminous.
- unable to serve as a guide to qualified instructors.

STUDENT MANUAL

The Student Manual is provided to support instruction carried on in the classroom, lab, and vehicle. It is not intended to instruct by itself, as would a text.

The Student Manual contains four types of material: curriculum overview information, text, procedures, and classroom information.

Curriculum Information

For each unit of the curriculum, students are provided information describing instruction. This descriptive information includes the following:

What You Will Learn in this Unit

A listing of the instructional objectives, derived from the instruction objectives in the Instructor Manual, but expressed in less formal terms.

What Will Happen in this Unit

A description of the activities that comprise unit instruction, including an outline of classroom presentation and a description of Lab, Range, and Street instruction.

Student Aids

A list of any text, procedure or reference information provided for the unit.

Text

Since students will acquire information during classroom instruction, and have an opportunity to practice its use in lab, range and street instruction, there is little purpose in providing the same information in the Student Manual. To do so would result in a manual approaching the size of an encyclopedia, which few schools could afford to make available to students. Moreover, it would serve no useful purpose, since it would duplicate the function of classroom and practical instruction.

The provision of textual information is confined to the instructional content that is sufficiently complicated as to create a learning problem for students who are unable to grasp things quickly enough to absorb the necessary information during classroom instruction. For this type of information, a brief text dealing with the more complex aspects of the content is provided in the Student Manual. The purpose of providing this information in printed form is to allow students an opportunity to (1) preview the information in advance, (facilitating their comprehension of it in the Classroom) and (2) review the information after the classroom instruction for clarification and as a refresher. An example is Vehicle Systems (Unit 4.1).

Procedures

Some of the more important procedures for safe tractor-trailer operation are provided in summary form within the Student Manual in order to allow the students to refresh their memory before undertaking activities that require their application. Examples of procedures include safety rules for range instruction, inspection checklists, and vehicle coupling procedures.

Classroom Information

A number of classroom lessons involve activities for which students require access to information in class. Such information is either provided or referenced in the Student Manual. Examples of classroom information include the following:

- Reference to specific paragraphs of Federal Motor Carrier Safety Regulations that will be reviewed during the Lesson (students are expected to be supplied current copies of these regulations).

- o Descriptions of problems used in problem-solving exercises
- o Scenarios for role-playing exercises.
- o Quizzes to be performed during classroom instruction.
- o Diagrams and other graphic presentations needed to supplement the verbal presentation of the instructor.
- o Copies of visuals used in classroom instruction to which frequent access is desirable.

VISUALS

Classroom lessons make extensive use of visuals. The only type of visual specifically required is the overhead transparencies. The reason for using transparencies is (1) they can be used without darkening the room, thus allowing students access to reference information that must be used during lessons, (2) they allow instructors to interact with them, adding information and highlighting certain areas, and (3) they can be reproduced from hard copy provided with the Instructor Manual, making it unnecessary to procure separate packages of visuals.

Over 700 visuals are furnished as a part of the curriculum. The visuals are provided in hard copy forms in two ways:

- o Original copy is provided in an unbound packet so as to be suitable for reproduction by school administrators.
- o Copies of the visuals for each unit are provided in the Instructor Manual, immediately following unit lesson plans, so instructors can familiarize themselves with the visuals before teaching a lesson.

For positive identification, each visual is identified by a five-digit code, as are all pages. In addition, each is also labeled with the word "Visual" in the upper margin, followed by the number as shown in the lesson , e.g., "Visual-5."

SUMMARY OF INSTRUCTION UNITS

The Curriculum consists of five major sections. Each section contains a number of units, and the units each contain a number of individual lessons.

Sections

The five major sections of the Curriculum are as follows:

Section 1 - Basic Control--This section is concerned with the interaction between students and the vehicle. It is intended to enable students to control the motion of the vehicle, make sure it is in proper operating condition, and correctly coupled to trailers.

Section 2 - Safe Operating Practices--This section is concerned with the interaction between the student/vehicle combination and the highway traffic environment. It is intended to enable students to apply their basic operating skills in a way that ensures their own safety and that of other road users.

Section 3 - Advanced Operating Practices--This section is concerned with the higher level skills needed to cope with the hazards of the roadway-traffic environment. Its purpose is to develop visual perception skills needed to recognize the potential hazard as well as the manipulative skills needed to handle the vehicle in an emergency.

Section 4 - Vehicle Maintenance--This section is concerned with how the various components of the vehicle work to enable the student to recognize a malfunction or safety hazard before it can cause serious damage or an accident. It also teaches the students to perform routine service functions and simple maintenance tasks, as well as how to recognize when the vehicle needs expert professional service or repairs.

Section 5 - Nonvehicle Activities--This section is concerned with activities that are not directly related to the vehicle. Its purpose is to see that these activities are carried out in a way that ensures safety to the driver, vehicle, cargo, and other motorists.

Units

Instruction within each section is subdivided into units. A unit is a set of instructional activities having the same instructional objectives. The Curriculum has 29 units, each having one or more lessons.

Lessons

Each unit consists of one or more lessons. A lesson is a group of similar learning activiites taught under the same basic instructional methods. Lessons form the basic elements of the curriculum. Most lessons are taught in a single session. A few lessons, mostly range and street lessons, are taught in more than one session, spread out over several hours, and often several days. Each lesson is taught in one of the following modes:

Classroom--Classroom instruction is instruction that takes palce indoors, accompanied by instructional aids that allow large numbers of students to be taught effectively at one time.

Lab--Laboratory instruction refers to any instruction taking place outside of a classroom that does not involve actual operation of the vehicle or its components. It may take place in a parking lot, garage, range or facility owned by a dealer or fleet operator.

Range--Range instruction is instruction that takes place on a protected offstreet "Driving Range", where students may make use of tractor-trailers without hazard from cars or other road users. Those schools that lack access to offstreet facilities may conduct range instruction on a public highway provided there is adequate control of other traffic to avoid danger to students, instructors or other road users.

Street--Street instruction refers to behind-the-wheel (BTW) instruction that takes place in roadway configuratons and traffic conditions needed to satisfy the objectives of the lessons for which the instruction is required.

No one lessons involves more than a single mode.

Instructional Sequence

The first three secitons of the Curriculum form a natrual learning sequence beginning with basic control of the vehicle's motion (Section 1), adding to this activity the needs of the highway traffic environment (Section 2), and finally introducing the advanced skills (Section 3), that can only be acquired once the more fundamental skills have been mastered.

Units of Sections 4 and 5 are relatively independent and can be taught in any sequence. Because they involved primarily classroom and laboratory instruction, they may be scheduled concurrently with the Range and Street instruction of Sections 1, 2, and 3 so as to make the most efficient possible use of school equipment and facilities at all times.

CURRICULUM OUTLINE

The following is an outline of the course, giving the titles of sections, units, lessons, and minimum times for each lesson. C = Classroom; L = Lab; R = Range; and S = Street.

SECTION 1 - BASIC OPERATION

Unit 1.1 - Orientation

Lesson 1 - Orientation to Tractor-Trailer Driver Training (2 hours) C
Lesson 2 - Introduction to the Tractor-Trailer (75 minutes) C
Lesson 3 - Orientation to the Tractor-Trailer (60 minutes) L

Unit 1.2 - Control Systems

Lesson 1 - Introduction to Vehicle Instruments and Controls (1-3/4 hours) C
Lesson 2 - Instrument and Control Familiarization (45 minutes) L

Unit 1.3 - Vehicle Inspections

Lesson 1 - Vehicle Inspections: Procedures (2 hours) C
Lesson 2 - Vehicle Inspections: Practice (4 hours) L

Unit 1.4 - Basic Control

Lesson 1 - Introduction to Basic Control Maneuvers (45 minutes) C
Lesson 2 - Starting and Turning Off the Engine (35 minutes) R
Lesson 3 - Putting the Vehicle in Motion (100 minutes) R
Lesson 4 - Turning the Tractor-Trailer (5 hours) R

Unit 1.5- Shifting

Lesson 1 - Shifting Procedures (75 minutes) C
Lesson 2 - Development of Shifting Skills (3 hours) R

Unit 1.6 - Backing

Lesson 1 - Backing Procedures (45 minutes) C
Lesson 2 - Development of Backing Skills (22 hours) R

Unit 1.7 - Coupling and Uncoupling

Lesson 1 - Coupling and Uncoupling Procedures (45 minutes) C
Lesson 2 - Coupling and Uncoupling Skills (3-1/2 hours) R

Unit 1.8 - Proficiency Development: Basic Control

Lesson 1 - Introduction to Proficiency Development Exercises (90 minutes) C
Lesson 2 - Proficiency Development Exercises(36 hours) R
Lesson 3 - Proficiency Development: Practice in Basic Control (18 hours) S

Unit 1.9 - Special Rigs

Lesson 1 - Characteristics of Special Rigs (60 minutes) C
Lesson 2 - Observation of Special Rigs (3-1/2 hours) L

SECTION 2 - SAFE OPERATING PRACTICES

Unit 2.1 - Visual Search

Lesson 1 - Visual Search Principles (75 minutes) C
Lesson 2 - Use of Mirrors (45 minutes) L
Lesson 3 - Application of Visual Search (8 hours) S

Unit 2.2 - Communication

Lesson 1 - Principles of Communication (75 minutes) C
Lesson 2 - Application of Communication (3 hours) S

Unit 2.3 - Speed Management

Lesson 1 - Speed Management Principles (2 hours) C
Lesson 2 - Speed Management Demonstration (1-3/4 Hours) R

Unit 2.4 - Space Management

Lesson 1 - Space Management Principles (1-3/4 Hours) C
Lesson 2 - Application of Space Management (6 hours) S

Unit 2.5 - Night Operation

Lesson 1 - Night Operation (45 minutes) C
Lesson 2 - Night Operation: Basic Maneuvers (3 Hours) R
Lesson 3 - Night Operation: Onstreet (4-1/2 hours) S

Unit 2.6 - Extreme Driving Conditions

Lesson 1 - Operation During Extreme Driving Conditions (3-1/4 hours) C
Lesson 2 - Techniques Used During Extreme Conditions (4 hours) R

Unit 2.7 - Proficiency Development: Safe Operating Procedures

Lesson 1 - Procedures for Safe Operation (60 minutes) C
Lesson 2 - Practice in Safe Operation (70-1/2 hours) S

SECTION 3 - ADVANCED OPERATING PRACTICES

Unit 3.1 - Hazard Perception

Lesson 1 - Recognizing Hazards (90 minutes) C
Lesson 2 - Application of Hazard Recognition (6 hours) S

Unit 3.2 - Emergency Maneuvers

Lesson 1 - Emergency Procedures (90 minutes) C
Lesson 2 - Emergency Skills (4 hours) R

Unit 3.3 - Skid Control and Recovery

Lesson 1 - Techniques of Skid Control and Recovery (75 minutes) C
Lesson 2 - Skid Control and Recovery Exercises (7-3/4 hours*) R

SECTION 4 - VEHICLE MAINTENANCE

Unit 4.1 - Vehicle Systems

Lesson 1 - Vehicle Systems (11-1/4 hours) C
Lesson 2 - Vehicle Systems Demonstration (2 hours) L

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* Optional

Unit 4.2 - Preventive Maintenance and Servicing

Lesson 1 - Nature and Importance of Preventive Maintenance (1-1/4 hours) C
Lesson 2 - Engine Fluids, Filters, Lights and Fuses (3 hours) L
Lesson 3 - Changing Tires and Checking Tire Air Pressure (2 hours) L
Lesson 4 - Reservoir Drainage and Brake Adjustment (2-1/2 hours) L

Unit 4.3 - Diagnosing and Reporting Malfunctions

Lesson 1 - Diagnosing and Reporting Malfunctions (3 hours) C
Lesson 2 - Emergency Starting Procedures (1 hour) L

SECTION 5 - NONVEHICLE ACTIVITIES

Unit 5.1 - Handling Cargo

Lesson 1 - Basic Cargo Handling Procedures and Requirements (3-1/2 hours) C
Lesson 2 - Techniques for Loading, Securing and Unloading Cargo (1-1/2 hours) C
Lesson 3 - Demonstration of Cargo Securement (2 hours) L
Lesson 4 - Observation of Cargo Handling Operations (2 hours*) L

Unit 5.2 - Cargo Documentation

Lesson 1 - Cargo Documentation: Basic Forms and Procedures (2-3/4 hours) C
Lesson 2 - Cargo Documentation Problems (2 hours) C

Unit 5.3 - Hours of Service Requirements

Lesson 1 - Basic Requirements of Hours of Service Regulations (2-1/4 hours) C
Lesson 2 - Complying with the Hours of Service Regulations (1-3/4 hours) C
Lesson 3 - Log Keeping Exercise (1-3/4 hours) C

Unit 5.4 - Accident Procedures

Lesson 1 - Accidents and Accident Reporting (1-3/4 hours) C
Lesson 2 - Principles of First Aid (10 hours*) C
Lesson 3 - Fires and Firefighting (1-1/4 hours) C
Lesson 4 - Firefighting Demonstration (45 minutes) L

Unit 5.5 - Personal Health and Safety

Lesson 1 - Personal Health and Driving (2 hours) C
Lesson 2 - Safety Equipment and Practices (1-3/4 hours) C
Lesson 3 - The Truck Driver's Environment (1-1/4 hours) C

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* Optional

Unit 5.6 - Trip Planning

Lesson 1 - Trip Analysis and Trip Procedures (3-1/4 hours) C
Lesson 2 - Trip Planning Exercise (1-1/2 hours) C

Unit 5.7 - Public and Employer Relations

Lesson 1 - The Driver's Role in Public Relations (1-1/2 hours) C
Lesson 2 - Employer Relations (2-3/4 hours**) C

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* Optional - 2-1/2 hour minimum required
** Optional - only 2 hours required

NOTE: Please refer to the BMCS Training Standards for full details on optional lessons.

SAMPLE TRAINING SCHEDULES

The training time requirements for this curriculum is as follows:

The minimum time required to complete this curriculum (including all optional lessons) is 320 hours (8 consecutive weeks) of 5 days each, with a daily limitation of 8 hours of training to be completed within 10 consecutive hours, subject to student instructor ratios chosen (see Student/Instructor Ratios in the BMCS Training Standards).

Full-time training described above is recommended but not mandatory, part-time training programs, e.g., nights, weekends, etc. are permissible as long as all of the requirements of the curriculum are met.

The 8 hour daily maximum training specified in item one above is recommended, not mandatory. However, training days lasting longer than 8 hours are of very questionable value because of student fatigue. Furthermore, 8 hour training days will of necessity have to contain breaks or rest periods and provide time for rotating students from classroon to range to street lessons. Thus an 8 hour training day quickly becomes a 10 hour day. A recommended sample daily training schedule may be found on the following page. While this is only a recommendation, it would appear to be the maximum for productive student learning.

The required nighttime street training lessons, and/or the extended student road training trips (optional), will require an adjustment of such schedules, but in no case shall students be subjected to hours exceeding those specified in Part 395 - Hours of Service of Drivers, in the Federal Motor Carrier Safety Regulations.

Home study or correspondence-type courses may be utilized to prepare students for in-residence training. However, the full 320 hour residency training requirements must be met except as provided for in the General Curriculum Standards under allowable Time Waivers for Classroom Time.

DAILY OPERATION SCHEDULE (SAMPLE)

Period	Class Time Start-End	Subject	Training Hours
1.	07:45 - 08:00	Written quiz on previous day's work and turn in previous day's duty status record	-
		Break	-
2.	08:00 - 09:05	Next subject in sequence	1
	09:05 - 09:10	Break	-
3.	09:10 - 10:10	Next subject in sequence	1
	10:10 - 10:15	Break	-
4.	10:15 - 11:15	Next subject in sequence	1
	11:15 - 11:20	Break	-
5.	11:20 - 12:20	Next subject in sequence	1
	12:20 - 13:10	Break	-
6.	13:10 - 14:10	Next subject in sequence	1
	14:10 - 14:15	Break	-
7.	14:15 - 15:15	Next subject in sequence	1
	15:15 - 15:25	Break	-
8.	15:25 - 16:25	Next subject in sequence	1
	16:25 - 16:30	Break	-
9.	16:30 - 17:30	Next subject in sequence	1
	17:30 - 17:35	Break	-
10.	17:35 - 17:50	Service and secure vehicles, prepare daily vehicle condition reports and complete Driver's Duty Status Records.	
Totals		8 Subjects	8 Hours

INSTRUCTOR SELECTION

The foundation of all training programs is a fully competent instructor. The instructor brings together the facilities, materials, and equipment needed to attain the objectives of the training program. The instructor is responsible for making sure that learning occurs according to the philosphy and resources of the institution which he or she represents. A competent instructor helps students learn effectively and efficiently. The instructor's skill, as well as personality, and personal traits all contribute to success in achieving the objectives of the training program.

The ideal instructor is the one who can do all instructional jobs efficiently. However, no single instructor will possess all the competencies nor have all the abilities necessary to prepare tractor-trailer operators. Moreover, to use only individuals who are university qualified would be extremely costly. What is needed is a mix of instructor skills and capabilities appropriate for attaining the objectives of the Curriculum. To provide a competent cost-efficient staff, three categories of instructional personnel are required: Instructor, Assistant Instructor, and Lecturer.

Instructor--The instructor is responsible for overall management of the learning experience given students. The Instructor is responsible for ensuring that students learn, gauging the effectiveness of instructional methods and materials, directing the efforts of other instructional staff, maintaining records, and interacting effectively with school management to bring the necessary resources to the learning environment. The instructor must be in command of the subject matter, be competent in the use of several instructional methods, interact effectively with students, direct the efforts of other instructional staff, communicate with management and do so within the constraints and pportunities afforded by the school policy.

Assistant Instructor--The assistant instructor must understand the subject matter of the curriculum, provide instruction under the direct supervision of an instructor, and work effectively with students in the development of student competencies and skills. The assistant instructor must be capable of carrying on several tasks under the general surveillance of the instructor. These tasks include conducting practice exercises introduced by the instructor, supervising the development of skills (previously introduced by the instructor), administering unsupervised instruction where students have previously received prior training and only need practice, handling administrative aspects of instruction such as keeping records, recording test scores and adminsterring tests, and supporting the instructor through obtaining equipment, using the equipment in demonstrations, and setting up training exercises (e.g., setting up range exercises).

Lecturer--The lecturer must be able to present highly technical and specialized information. The lecturer should be used to supplement overall staff competencies in technical areas and to provide real first-hand experiences to students in the latest techniques of truck driver training and associated job requirements.

ROLE OF INSTRUCTORS

The overall instructional staff must have the mix of skills to cost efficiently deliver all methods of instruction employed by the training school. The staff should have competencies in classroom, independent study, laboratory, range, and street methods. An instructor must be capable of and responsible for delivering instruction by using all methods. An assistant instructor would be primarily responsible for range and street instructional methods. A lecturer would be primarily responsible for delivering instructions using classroom and laboratory methods.

Classroom Methods

Staff must be capable of managing classroom learning experiences including interacting with the "adult learner" and using instructional aids to their best advantages in accomplishing course objectives.

Independent Study Methods

The staff must be capable of guiding independent study of the students toward the attainment of knowledge objectives that can be efficiently acquired without the participation of an instructor. In doing so, instructional staff must be able to direct students in a way that recognizes students' individual strengths and weaknesses. This activity requires understanding the abilities and motivations of students to learn as well as establishing the incentives for learning. Importantly, the staff must be able to communicate to students the importance of independent study and the fact that they will be held responsible for learning certain aspects of course content on their own.

Laboratory Methods

Instructor must be capable of demonstrating a wide range of truck driver practices (actual vehicle operation, vehicle maintenance, etc.) in such a manner that students will be able to subsequently appreciate the need for performing certain tasks as well as be able to perform those tasks themselves. For example, in the topic area of vehicle inspection, the instructional staff must not only know what to do in an inspection, but be able to perform it correctly while explaining to the students both the necessity for performing the steps and how to perform each step in the inspection. Importantly, instructional staff must realize how students learn in this regard. Students learn by seeing (observing what the instructor does) and by hearing (listening to the instructor's explanations). Students also learn by doing.

To effectively conduct laboratory instruction, the instructor must be sensitive to the contributions "seeing", "hearing", and "doing" make in learning.

Range Instruction

Instructional staff must be capable of efficiently setting up and guiding learning experiences in the range environment. In guiding learning experiences, the instructor must be sensitive to the total group needs as well as the needs of individual students. The instructor must be capable of directing group practice experiences while correcting deficiencies of individual students. In order to do so, the instructor must have command of the skills being taught, be capable of identifying deficiencies in student performance, and also be capable of correcting individual student deficiencies while at the same time maintaining overall management of the learning experience.

Street Methods

In street lessons, the instructor must be able to communicate the requirements for vehicle handling and safe operating practices in a dynamic traffic world, appraise student proficiency, provide feedback on strengths and weaknesses, and determine the requirements for remedial instruction and practice in order to achieve proficiency. The onstreet instructional method must lead to the attainment of instructional objectives and do so with regard for the safety of students, the instructor, and others using the roadway.

Observer Instruction

In both Range and Street instruction, the instructional staff must be capable of providing instruction to student drivers while effectively dealing with student observers. Instructors must actively involve the student observers in learning activities by directing their attention to specific aspects of the traffic scene and identifying safe driving practices for coping with the traffic scene. This involvement may be achieved using structured learning activities such as completion of checklists or other materials designed to enhance the observational experience.

Demonstration Methods

In Laboratory, Range and Street lessons, instructors must be capable of effectively demonstrating all performances that are assigned to the behind-the-wheel methods (Range and Street instruction). They must be able to conduct demonstrations by (1) employing safe operating practices and (2) communicating the techniques employed to achieve the vehicle response.

INSTRUCTOR QUALIFICATIONS

A number of instructional staff qualifications are identified in the Bureau of Motor Carrier Safety Proposed Training Standards for Tractor- Trailer Operators. The qualifications are set forth to ensure that instructors who are selected possess high levels of both driving and teaching ability. The specific instructor qualification factors that should be considered in selecting and assigning instructors to the tractor-trailer training program are enumerated here. The qualifications noted include and expand on those identified in these proposed Standards.

Educational Experience

While formal education is needed by instructors, a school cannot expect, nor is it necessarily desirable, to hire instructors with college degrees. More important is the nature of the education they have obtained.

The primary reason for imposing a formal education requirement is to ensure that instructors can employ the methodologies of teaching required by the Curriculum. The type of formal education required is that which enhances ability to teach.

Vocational Education

A background in vocational education is especially appropriate because it aids instructors in

- managing of learning within the environment of tractor-trailer operation
- communicating concepts and in applying the concepts in real world task performance
- working with individual students to develop skill and ability in performance of manipulative tasks.

Other Programs

In addition to vocational education, several other specific types of educational backgrounds lend themselves to particular requirements imposed in tractor-trailer operation:

- Industrial education--for understanding of auto mechanics
- Physical education--for understanding of psycho-motor skill development
- Driver education--for understanding of safe motor vehicle operation and development of vehicle handling skills.

Means of Qualifying

Several different educational background can be used as evidence of meeting the instructor qualification requirements. Alternatives range from degrees in education to specialized in-service training programs. The Standards include college instruction, teaching methods instruction, and in- service training.

College-Level Teacher Preparation

A 2-year program in teacher preparation would be appropriate. The teacher preparation program could be at any level--elementary, junior high, or high school. To meet a 2-year requirement in teacher preparation, the individual would, in most instances, also be exposed to 2 years of general study. This would result in a bachelor's degree in education. The degree itself is not of critical importance. Most important is that the 2 years of teacher preparation provide a good exposure to courses in instructional methods, learning theory, curriculum, and other career subjects designed to improve performance as an instructor.

Teaching Methods Instruction

Six semester hours (or the equivalency in quarters and trimesters) of course work in teaching methods is evidence of an appropriate education in teaching methods. The 6 hours of course work must be in teaching methods. Methods courses could be taken for any level of learner including elementary, junior high and senior high students as well as the adult learner (adult education). The courses should be specifically in instructional methods and not in other topical areas of education. The appropriateness of courses can for the most part be determined by examining course titles. Acceptable course titles include the following:

- Educational Methods
- Methods of Instruction
- Methods of Teaching
- Teaching Methods
- Teaching for the Upper Grades
- Teaching for the Lower Grades
- Teaching for the Middle Grades
- Individualized Instruction
- Practicum in Teaching

Background courses may be helpful. They should not, however, replace the basic 6 hour credit. They can be viewed as supplemental and cannot supplant the basic experience that can be gained through courses similar to those identified above. Supplemental courses may be identified by such titles as the following:

- o Innovations in Education
- o History of Education
- o Educational Theory
- o Abnormal Psychology
- o General Psychology
- o Educational Psychology
- o Experimental Psychology
- o Instructional Design
- o Instructional Technology
- o Curriculum Development
- o Educational Administration
- o Issues in Education
- o Foundations in Education

Acceptable courses may also be taken from a specific area of study, such as Methods of Teaching Industrial Arts, Methods of Teaching Physical Education, Methods of Teaching the Slow Learner, and Methods of Teaching the Adult Learner.

In-Service Training

One hundred hours of in-service instructor preparation in tractor-trailer driver training may be used to fulfill the instructor qualifications requirements. In order to serve as acceptable substitutes for formal instructor preparation, the in-service training must meet the following conditions:

- o The program must occur in tractor-trailer driver training and not other related subject matters such as emergency medical vehicle services, dispatching, fleet management, and fleet operations.
- o The in-service experience must be tailored to the teaching of the tractor-trailer driver training curriculum for which this Administrative Manual is developed.

- The in-service program should be designed to develop instructor skills. Regular in-service programs that are offered for maintenance of instructor skills should not be substituted for the initial 100 hours of specific preparation in instructional methods.

The in-service requirement may be met through several alternatives including (1) selecting instructors who have already had an opportunity to participate in the in-service program, (2) providing the training before employment or soon after employment in order to qualify the person, or (3) having individuals serve as assistant instructors and providing them the 100 hours of in-service training throughout the first several months of employment while they perform as an assistant instructor.

In-service work experience in education programs also may be substituted for the formal educational experience. Teaching experience in vocational education appears to be the most appropriate work education experience to consider in lieu of formal education. Two years of work experience in vocational education provide acceptable evidence of teaching ability.

Driving Experience

The ability to operate a tractor-trailer skillfully and demonstrate safe operating practices is necessary to teach the Curriculum. Qualified instructors must not only be able to explain what correct driving consists of but be able to demonstrate any aspect of driving covered by the course. Some schools prefer to employ the million-mile, over-the-road driver. However, while driving experience contributes to teaching, extensive experience is not an essential requirement. While a million-mile driver may have developed instincts which helped him survive, his exposure will not ensure his teaching capability. Moreover, his survival insights probably can't be readily communicated to a person with lesser experience who is only learning to drive.

As a minimum, 2 years of tractor-trailer driving experience should be required. The experience should be recent. However, should a candidate instructor have 2 years of experience in the last 5 to 7 years, that should guarantee a sufficient level of operating skill to meet course requirements. This would be especially true if the candidate instructor had gained experience in fleet management or transportation in the interim. Driving experiences in the operation of other trucks should not be used as a substitute for tractor-trailer driving experience.

Driving Record

Instructors must have a good driving record. A good driving record is evidence of one's ability to handle a vehicle and employ safe operating practices. Both of these are critical to instructing students in this

course. The driving record may be checked with past employers and through an official records check with the State. Since these sources may not reveal all violations of traffic laws, a driver with a "clean" record may not really be a safe driver.

An instructor should have no more than one moving violation within the previous 3 years. While this standard may appear to be high, it is necessary to make up for deficiencies that may exist in existing records and for lag time between the committing of the offense and the posting of the offense to the records. A record check of 3 years duration is sufficient. Earlier driving records are not necessarily predictive of present or future driving behavior.

Age

Instructors must meet minimum age requirements for a license as a tractor-trailer driver in the State in which the school operates. Beyond this, there are no fixed age requirements.

Drivers who just meet minimum age requirements would not be good prospects as instructors. First, they are not likely to have the experience in general driving and in tractor-trailer operation needed to supervise on-street instruction. Secondly, they are likely to lack the maturity and judgment both to handle difficult traffic situations and to deal effectively with the personalities of different students. As a rule of thumb, instructors should be at least 25 years of age unless their measured driving ability, driving record, teaching experience, and personality characteristics clearly establish them as qualified.

The upper age limit is established only by the individual's physical stamina, general health, and mental alertness. However, since these characteristics have been shown to deteriorate in many individuals after age 60, with a consequent increase in accident likelihood, drivers over this age should be required to take a physical and should be evaluated for their ability to operate the vehicle under adverse traffic and environmental conditions.

The motivation of older drivers to become instructors should be studied. Many long-haul drivers seek teaching positions as a way of achieving a more normal home life. While this motivation is not unfavorable, it is insufficient in itself to make an applicant a promising instructor. One motive that is definitely unfavorable is that of the older, retired driver who looks upon instruction primarily as a way of passing the time or supplementing retirement income.

Health

Behind-the-wheel instructors must meet at least the physical requirements for drivers as specified in Part 391 of the Federal Motor Carrier Safety Regulations. While there is no evidence that unhealthy people are more interested in a tractor-trailer instructor position than healthy

people, there is some likelihood that persons with health problems or injuries incurred while driving, may be looking for a less demanding position. Candidates with this motivation, of course, may be detected through various steps of the interview process.

Physical Health--Instructors must have the physical health to provide on-street instruction, conduct range lessons, and conduct demonstrations in the lab. All of these tasks require stamina and in many cases agility. In addition, the Curriculum requires a lot of range and in-cab time in comparison with classroom instruction. Range and onstreet instruction are physically demanding.

- Range--Unless the range has a control tower, instructors will be on their feet for long periods of time. Further, they must move about frequently in order to communicate instructions to students, assess student performance, and provide students guidance on performing maneuvers. Additionally, they may have to perform these responsibilities under a wide variety of weather conditions. A person must be both in good physical health and physically fit to meet range instructional requirements.

- Onstreet--On-street instruction requires good physical health as well as mental health for handling the strain caused by the simultaneous need to: (1) instruct the behind-the-wheel operator, (2) deal with the student observers, and (3) ensure that the vehicle is operated safely on the public streets. Further, owing to the extensive amount of street instruction, on occasion an instructor will need to remain in the cab all day. Street instructors must be able to handle physical and mental strain for long periods of time repeatedly on a daily basis.

Mental Health--The Curriculum requires instructing students under all possible conditions including heavy traffic, bad weather, and at night. Riding with student drivers, instructors will encounter more crises and potential emergencies in one day, than many will have faced in a year. Instructors must be able to handle the stress in teaching under all these conditions. The stress is compounded by working with students who have a wide range of performance capabilities, as well as individual personalities and temperaments. The instructor must cope with these factors in the most facilitating way to achieve the objectives of street instruction.

The street instructors actually work in a "mobile classroom" with the mission of improving the performance of an individual driver while developing increased understanding of driving practices by student observers in the cab. Imposed on the responsibility of managing a mobile classroom is the requirement to ensure public safety. Clearly, not all instructors have the emotional stability to cope with these stressful conditions for long periods of time.

Driving Ability

Driving ability consists of knowledge (what to do), skill (being able to do it), and actual performance (doing it). The instructor's ability must far exceed ability identified in the objectives of the curriculum. However, as a minimum, instructors must at least have a basic grounding in the knowledges and skills taught by the course. This can be determined by administering the Final Examination Test Battery portion of the BMCS Tractor- Trailer Driver Training Standards, consisting of the Knowledge Examination, Range Test (TORT), and the Street Test.

Candidates may evidence a lack of understanding of the subject matter (e.g., operation of diesel engines, safe operating practices, diagnosis of malfunctions, etc.) or they may be deficient in specific skills or performances. For example, an over-the-road driver may not be able to perform tight quarter manuevers very well (e.g., backing, docking, etc.). Any number of instructors may not be able to handle skill areas such as skid recovery very well.

Not having taken the curriculum, candidate instructors may have various weaknesses relative to course objectives. One or two specific areas of weakness would not necessarily rule them out as an instructor. However, if they are deficient in several areas, it requires the investment of providing in-service training to bring their ability up to an acceptable level.

While instructors should evidence mastery of most of the objectives of the curriculum, they should not necessarily be prequalified in specific administrative characteristics of the curriculum. For example, there's no reason for them to have an understanding of the overall unit structure, number of lessons, hourly allocations, or particular schedules employed by the school.

Teaching Ability

Applicants for an instructor position should be able to teach by employing the teaching methods called for in the curriculum. The basic abilities required, ways of assessing these abilities and additional competencies that contribute to teaching ability are discussed below.

Required Abilities

The curriculum requires effective utilization of classroom, range, street, observation and demonstration methods. While candidates would not be expected to know characteristics of methods employed in lessons of the curriculum, they should have knowledge of the role and function of each of the methods employed. As a minimum, the candidate should have a knowledge of and appreciation for what each method contributes to the student's overall acquisition of the course objectives.

Classroom Method

Classroom instruction provides for the acquisition of the vast majority of knowledge and attitude objectives. The classroom is where most information is introduced and learned and where students will gain a theoretical and practical understanding of requirements for vehicle handling and safe operation. In addition, the classroom provides that information necessary to motivate and permit one to perform the various maintenance and inspection routines.

To assure effective communication of information the instructor must be sufficiently articulate to be able to make a lucid presentation from the lesson plans. Classroom instruction also makes considerable use of classroom problem-solving exercises and instructors are encouraged to interact with students in developing concepts and principles. The ability to conduct highly interactive instruction requires both a cordial and patient personality and sufficient depth of understanding to be able to field student questions effectively.

Range

The range provides a protected learning environment where mastery of basic handling skills can be achieved in a cost-effective manner. Candidate instructors would have to believe that learning can take place other than on a one-to-one basis (student-instructor ratio). Instructors also must feel confident in the ability of students to learn without their directly supervising every action. Instructors would have to know how to efficiently and effectively utilize an assistant instructor in order to maintain an efficient range operation. Range instruction is fundamental to the acquisition of skill objectives. It is the method in which most basic operating and handling tasks are mastered and it provides the underlying skills for the demonstration of safe operating practices on the street.

Street Instruction

While this course provides more time for street instruction than for any other method, only those things that are best accomplished on street are allocated to street lessons and a great deal of time is provided for on street instruction. Instructors have to accept the purpose of street instruction. It gives students the opportunity to learn and use (1) safe operating practices, (2) demonstrate their ability to interact with the highway traffic environment, and (3) develop proficiency in the various types of driving situations. The purpose of street instruction is not to introduce basic operating or handling skills.

The importance of using street instruction time to teach safe operating practices cannot be overemphasized. These practices cannot be learned or demonstrated in any other method of instruction (e.g., classroom or range). In a traffic situation, things are constantly changing and the instructor must be capable of providing instruction as the situation is evolving. Those that are unskilled in teaching, uninformed on safe operating practices, or untutored in analysis of student performance will misuse street instructional time.

Additional Competencies

While a candidate instructor must have an understanding of teaching and knowledge of tractor-trailer operation, there are a number of other subject matter areas that are supportive of one's ability to provide effective instruction in tractor-trailer training curriculum. These areas include:

- Traffic Safety Education--A knowledge of the overall problems, approaches to solving problems through educational approaches appropriate for pedestrian, bicycle, passenger car operators, operators of special vehicles (motorcycles).
- Traffic Law--Understanding of traffic laws, their relation to safety, their need and importance.
- Fleet Management--Understanding of the overall requirements for effective management of fleets.
- Fleet Operation--An understanding of the day-to-day requirements, procedures, support systems, etc., for effective fleet operation.

Philosophy of Learning

Two philosophies of learning that are extremely detrimental to student attainment of course objectives are:

- All learning is achieved by instructors talking and demonstrating.
- The only way of learning is doing, e.g., behind-the-wheel instruction.

Neither a totally teacher-centered or student-centered philosophy is appropriate to the curriculum. An instructor must understand the roles of each of the instructional methods and the relative contribution that each of these methods makes to student achievement objectives. Students learn both by listening and by experiencing. Mastery of the fundamental elements of performance must be achieved before any application occurs. Unless the instructor's philosophy encompasses all the different modes of instruction, he/she will tend to do one or more of the following:

- o show disdain for certain methods of instruction
- o have little empathy with instructors who teach other methods
- o attempt to teach all subject matter by whatever mode of instruction they prefer.

This may result in topics being taught inefficiently or omitted. Candidate instructors should therefore evidence a knowledge and understanding of all methods even though they themselves are fully qualified only in one or two.

Characteristics

Personal characteristics in general are not a good predictor of ones ability as an instructor. However, certain personal characteristics provide a good gauge of how prospective instructors will conduct themselves in the classroom:

Attitude--Instructor's attitudes toward various aspects of tractor-trailer operation cannot help but show up in their teaching. Those who are enthusiastic about the trucking industry, generally concerned about safety, and convinced that their instruction will influence the driving of their students are the ones that are most likely to be successful in teaching tractor-trailer driving generally, and the Curriculum in particular.

Personality--While there is no one personality that ensures effective teaching, instructors who are warm and friendly, interested in others, and motivated by a sincere desire to help people learn will make better instructors than those whose satisfaction comes in showing off, who are more interested in the vehicles than the people who drive them, who tend to be impatient with people, or who view teaching as a painful chore.

General Appearance--While appearance has little to do with one's teaching, it can greatly influence how students respond. A neat appearance breeds respect for a teacher's ability to perform the job. People who have a slovenly appearance as prospective teachers are certainly not going to improve once they get the job.

DETERMINING INSTRUCTOR CAPABILITIES

To determine whether an instructor is qualified, a number of standard practices should be employed. These practices include:

- o Background checks
- o Testing
- o Interview

Background Checks

Prospective instructors may be able to conceal their liabilities in tests or during interviews. They cannot conceal them from the people who have known them and worked with them. Checks with prior employers, schools, and colleagues are potentially valuable sources of information. The emphasis must be on the word "potential," since these sources, if not handled well, can also conceal liabilities.

Checks With Employers

Most previous employers will give a candid appraisal of employee's capability. They are more likely to give a frank appraisal if you describe the type of job that you are asking the potential employee to perform. This will permit former employers to describe the candidate's skills and capabilities against the specific job requirements. Of course, in some cases, a candidate instructor will prefer that the former employers are not contacted. This can be handled in terms of your own business practices. However, the most recent employer need not be the one contacted in order to get an appraisal of candidate general qualifications. Earlier employers can generally be depended upon to provide a candid appraisal of a prospect since they have nothing to lose or gain from the outcome.

Check With Educational Institutions

Most college teachers will provide an appraisal of students' general capabilities and interest in the course materials. Additionally, universities maintain student records and will provide transcripts to potential employers on request with concurrence from candidate employees.

While schools and former teachers cannot be expected to provide an accurate appraisal of a candidate's promise as a tractor-trailer driving instructor, they can furnish an indication as to whether the individual has the ability and interest necessary to become an effective teacher.

Check on the Institutions

As with most organizations, some educational institutions do a better job than others. It's important to gain some understanding of the quality of the education the candidate may have received. Also, since course titles may be misleading, it is wise to check what was actually taught in the courses. These questions can be answered by checking college catalogues and talking with the teachers. For an appraisal of the institution itself, it is wise to call on representatives of the State Department of

Education to provide an independent evaluation of both the quality of programs offered by the educational institution and the quality of the specific course selected by the candidate instructor.

Testing

Prospective instructors can be tested for both their ability to teach and their ability to operate a tractor-trailer safely.

Check for Teaching Ability

A candidate's general teaching abilities can be assessed through former employers, assuming they were performing a teaching position. However, the acid test of a teacher's qualifications is whether or not he can teach the Curriculum. A common practice in filling teaching positions is to require people to teach portions of a curriculum (teach selected topics) to demonstrate their competency. In the case of a tractor-trailer driving instructor, it would be reasonable to require evidence of teaching ability as well as driving ability. Units of the Curriculum should be selected that requires candidates to demonstrate their ability to teach and their ability to handle a vehicle. This can be achieved by selecting lessons in which there is a requirement to demonstrate driving behavior or technique as part of that lesson. This could be done as follows:

1. Classroom Topic--Candidates would be asked to teach one topic (i.e., 20 minutes). They should be given adequate time to prepare for the lesson (e.g., overnight). Evidence of teaching ability would include (1) teaching the classroom lesson as outlined in the lesson plan, (2) using visual aids as called for in the lesson, (3) dealing with responding to student questions, and (4) presenting information in an understanding manner.

2. Range--Candidates would be asked to conduct a range session with students. The range lesson should be one that requires them to (1) effectively utilize an assistant instructor, (2) critique students' performances, and (3) demonstrate driving maneuvers. Any number of early range lessons dealing with shifting, backing, or coupling would be appropriate.

3. Street Instruction--Candidates would be asked to teach a 10 to 15 minute street segment of a lesson plan. In this case, current instructors could serve as students. Candidate instructors should be asked to teach lessons from Section 2, Safe Operating Practices, of the Curriculum. Lessons from several units in Section 2 are appropriate. Lessons from Units 2.1, Visual Search; 2.2, Communication; 2.3, Speed Management; and 2.4, Space Management may be selected. Lessons from these units permit appraising the utilization of instructional techniques and appraising the understanding of safe operating practices.

While one's ability to perform is never at its highest level of effectiveness when minimally prepared or under test conditions, sufficient evidence of the candidate's teaching abilities should surface. As a minimum, an appraisal of overall ability to communicate, understanding the Curriculum content, mastery of teaching methods, and ability to function "on their feet" should be possible. Making the appraisal based on work in the classroom, on range, and street should also provide useful information in determining the candidate's strengths in each of the areas. Depending on existing instructional staff capabilities and school needs, the candidate may be identified as an instructor with a wide range of capabilities or as one suitable for a special assignment (e.g., street instruction only). Obviously, the greater range of capabilities that instructors evidence, the more valuable they are to the school, and the more flexibility there will be in meeting course scheduling requirements.

An instructor who does not evidence an understanding of the course content or evidence a strong on-street capability should not be hired. Given the heavy orientation of street instruction in this Curriculum, all instructors will be required to carry their weight in this area. All will have to teach street lessons in order to complete the course in a reasonable time frame and over a time period that allows students to apply the information they gained in the classroom during street lessons.

Check for Driving Ability

Candidate instructors should be required to take the Final Examination Test Battery mentioned earlier in the discussion of driving ability. These tests can be administered by the school instructional staff. In order to determine how qualified candidates are, the scores of the candidate instructor can be compared with the scores of the top students in prior graduating classes and those of the existing instructional staff. Candidates who receive failing scores or who score more poorly than average course graduates on the range and street tests should not be considered as instructors. The time spent in in-service training would be too extensive. In the case of the Knowledge Test, because many knowledge items reflect concepts, principles and specific terminology taught in the course, as opposed to the general safe operating practices, the candidate instructor should not be penalized too harshly for incorrect answers.

Interview

The interview is the most commonly employed, and probably least productive, element of the selection process. Job applicants conceal far more than they reveal about themselves during an interview.

Effective interviewing is an art that requires a great deal of skill and this manual cannot provide that skill. However, following simple suggestions may lead to somewhat more productive interviews:

Listen--Talk with applicants, not at them. The interview should be a shared process; the interviewer finds out about the applicant, and the applicant finds out about the job. Interviewers who spend all of the time talking will learn little.

Avoid Impressions--Try to avoid forming impressions on the basis of the applicant's appearance or behavior during the interview. The most unpromising candidates can generally pull themselves together long enough to survive an interview. On the other hand, some of the most promising candidates, through nervousness, will create a false impression. Interviewers who pride themsleves on their ability to size up a candidate during an interview are generally those who suffer from faulty memory.

Obtain Information--The most useful function of an interview is the opportunity to obtain information that may not be available from other sources. For example, what the applicant was doing during a time gap that appears in the resume, what a job with a fancy title really consisted of, or why a particular former employer is not listed as a reference. Asking such questions at the interview will save telephone calls later on.

Ask Probing Questions--The candidate's knowledge of tractor-trailer operation, and the art of teaching it, can often be gauged by questions that cannot be readily put in the test. For example, the interviewer may describe a situation that occurred at the school and ask the candidate how he would have handled it.

Treat the Candidate as an Equal--Treat the candidate not as a favor-seeker, but as someone who could be of as much assistance to you as you could be to him. You need an instructor as much as the candidate needs a job. It can help create an atmosphere in which unqualified or inappropriate candidates may remove themselves from consideration. And, it helps to create a favorable attitude toward the school that may be of benefit on some future occasion.

ASSISTANT INSTRUCTOR SELECTION

Assistant Instructors are often looked upon as of lesser importance than Instructors. It is true that their qualifications differ, but so do their jobs. The point is that both the assistant instructor and the Instructor are needed to prepare students to attain Curriculum objectives.

Role of Assistant Instructors

A qualified assistant instructor may assist a qualified instructor by performing the following activities:

- o Administer Range Instruction under the general surveillance of an instructor.

- o Administer Street instruction after students have received prior training and only require practice.

- o Administer and score knowledge, range and street tests.

- o Handle administrative aspects of instruction including setting up range exercises (e.g., moving cones), and supporting classroom, range and street demonstrations.

An assistant instructor can also conduct classroom lessons so long as a qualified instructor is in attendance.

Since assistant instructors cannot command as high a salary as full instructors, their use can lower the cost of instruction. By using them in the roles just described, this cost savings can be realized without any sacrifice in the quality of instruction.

Assistant Instructor Qualifications

Under the Training Standards for Tractor-Trailer Operators, the qualifications required of assistant instructors are the same as those for instructors with the following exceptions:

Education--Assistant Instructors are required only to hold a high school diploma.

Experience--Minimum of two years tractor-trailer driving experience is required.

The remaining requirments--age, health, knowledge, and skill--are the same as those for instructors.

As far as those qualifications that are not covered by the Training Standards are concerned, the same general requirements concerning driving ability, teaching ability, attitude, personality, age, and health as described for Instructors should be applied to assistant instructors because of the similarity in their assignments. The only area in which requirements might be relaxed concerns the subject matter knowledge and skills required to teach classroom instruction. Since assistant instructors are not permitted to conduct classroom instruction on their own, they need not have the same qualifications as Instructors. However, assistant instructors who aspire to become instructors must at least have the basic abilities demanded by classroom instruction including articulateness and the ability to interact with students. Subject matter knowledge can be acquired over time.

LECTURER QUALIFICATIONS

As part of an overall instructional staffing pattern, lecturers may be utilized to aid students' acquisition of course objectives. Schools may employ lecturers to teach specific classroom or laboratory subjects in their particular areas of competencies. They are not permitted to provide range or street instruction. Unlike instructors and assistant instructors, who need credentials as drivers of tractor-trailers and as competencies in teaching methodology, Lecturers are selected because of their competencies in highly technical areas that support the trucking industry and are not necessarily required for operation of the vehicle. As such, lecturers are exempt from the qualification requirements for instructors or assistant instructors defined in the Training Standards, provided they teach more than once every 30 days. What qualifies a Lecturer is his or her specialized knowledge in a technical subject matter area. The use of lecturers should be encouraged in order to provide highly competent instruction in specific technical areas. Schools must not use lecturers as a means of subverting the requirements imposed on instructors and assistant instructors.

It is generally necessary to require lecturers to demonstrate teaching ability. However, it is not reasonable to require educational experience or training of a lecturer who will teach only a single subject (his or her specialization). However, there should be evidence of a lecturer's capability. Evidence can take the form of certificates, licenses, degrees, or job experience. Additionally, in general, a lecturer should exhibit an attitude toward tractor-trailer driving, the trucking industry and instruction commensurate with the requirements imposed upon other instructional staff.

Lecturer Assignments

Lecturers can be utilized as frequently as necessary to accomplish course objectives as long as they have a specialized technical capability and that capability is not met by an existing instructional staff. As many different lecturers as necessary to meet course objectives may be used.

Lecturers may be utilized for the topics that follow:

Unit and Subject	Lecturer
Vehicle Systems (Unit 4.1)	Automotive Engineer Manufacturer Industrial Arts Teacher
Preventative Maintenance and Servicing (Unit 4.2)	Maintenance Supervisor Mechanic
Troubleshooting and Emergency Repairs (Unit 4.3)	Maintenance Supervisor Mechanic
Handling Cargo (Unit 5.1)	Terminal (Dock) Supervisor
Cargo Documentation (Unit 5.2)	Terminal (Dock) Supervisor Supervisor of Shipping/Receiving

Unit and Subject	Lecturer
Accident Procedures: First Aid (Unit 5.4)	Red Cross First Aid Instructor Emergency Medical Technician
Personal Health and Safety (Unit 5.6)	Fleet Safety Manager Industrial Nurse
Trip Planning (Unit 5.6)	Fleet Manager Dispatcher
Public and Employer Relations: Job Interviews (Unit 5.7)	Fleet Personnel Manager Fleet Personnel Manager

Sources of Lecturers

Lecturers should be sought in the community where the school is located. Lecturers may be sought from transportation fleets, public agencies, volunteer organizations, vocational schools, and professional organizations.

While most lecturers will be paid consultants, some will be available on a voluntary basis. Public agencies may be willing to provide instruction if they can see that it is in line with their objectives. Voluntary services of lecturers are likely to be provided if (1) the time requirement is not excessive, (2) the individual is available, (3) they perceive that by assisting you, they are meeting the objectives of their own agency, and (4) the public agency views the school as providing a quality service. The last item is important since those providing voluntary services want to provide them where they will make the most impact. Where requests for services exceed the capabilities, agencies will provide services to those organizations that they think are doing the best job.

Checking Lecturer Capabilities

Regardless of whether services are paid for or provided on a voluntary basis, it is important that lecturers be competent in the subject they are teaching and capable of meeting the objectives of the lesson taught. While anyone who is thoroughly competent in a subject should be able to meet the objectives of the course, such is not always the case. Lecturers may be more concerned with telling what they know about the topic rather than communicating to students what students need to know. Activities brought into the classroom that do not help achieve the learning objectives short-change students and, in the long-term, short-change the school owner or operator. The following means should be employed to determine whether lecturers are capable in their speciality areas and capable of assisting in achieving course objectives.

Check Credentials

Many persons with specialized technical capabilities hold some kind of certificate or license. While these credentials will not necessarily guarantee that they are competent, they will at least signify whether others in the same area of technical expertise feel that they are competent. This is particularly true where the credentials are required by law. Licensing and certificates are not generally issued without a demonstration of competencies.

Get Recommendations

In some instances, where lecturers may be able to supply the names of people who can speak to their capabilities, particularly as teachers. This is a helpful approach and should be pursued just as one would check out a potential employee with a former employer.

Check Into Their Professional Activities

People in specialized areas often are affiliated with professional groups. While their affiliation may be only at the local level, the fact that they are affiliated with one or more groups tends to indicate whether or not others perceive them as being capable. Look into how many organizations that they are affiliated with and try to get some insight into how active they are in the organization. While membership alone is not a guarantee of capability, involvement is an indicator of enthusiasm and may provide some indication of whether individuals are up to date on developments in the profession.

Observe Their Performance

Look for or arrange an opportunity to observe the person performing in an instructional capacity. This observation may occur during the course of their regular employment, while they are providing guest lecturer services to some other group/organization, or while they are making presentations to professional groups. It is especially helpful to see lecturers in action. Their performance in front of groups is a good indicator of how they will perform in front of a class. Try to assess their communication capabilities. Look for positive and negative indicators of an attitude that would encourage or inhibit students from learning. Make a broad appraisal of their personal characteristics. Do they meet the requirements for appearance, enthusiasm, etc., that are imposed on other members of the instructional staff?

Identify Your Needs

Before selecting any lecturer on the basis of reputation alone, conduct an interview with the lecturer and spell out the school's needs. Describe specifically what the lecturer is to accomplish. Make sure they understand:

- the specific content to be communicated
- what it is the students will be required to do
- the level of knowledge that students bring to the class

Be sure to provide a copy of the lesson plan for the lesson to be taught so they will know exactly what they are expected to do.

INSTRUCTOR TRAINING

The instructor selection process is designed to help schools employ the most qualified instructors available. Even with unlimited resources, however, it is unlikely that one could employ an assistant instructor or instructor who would require absolutely no training. Clearly, all new instructors will need training in the administrative aspects of the Curriculum. Most instructors will also require some training in the subject matter as well. Training required by both instructors and assistant instructors will be of three types: technical training, supervised teaching, and in- service improvement.

TECHNICAL TRAINING

All new employees must be technically competent in the areas to which they will be assigned. This does not imply that they have to be technically proficient in all units of the Curriculum. Technical areas that are presently taught by other instructors need not be covered during preparation of new instructors. If they are, they need be provided only in enough depth to improve general understanding of the unit.

All instructors, including assistant instructors, must be provided the instruction necessary to overcome deficiencies revealed during the selection process. Deficiencies addressed in technical training should be confined to the ability to teach the instructional program. Deficiencies involving personal characteristics (e.g., appearance), should be handled individually and in counseling and administrative sessions rather than part of a training program per se. As a minimum, the technical training must encompass all objectives of the course. Some schools require that all instructors take the entire Curriculum to be taught. This approach does not appear reasonable on several counts:

(1) Employees needing that level of training should not have been hired to begin with.

(2) Training time is expensive. Few schools can afford the luxury of having someone on the payroll for 8 weeks without their being productive.

(3) Over 70 percent of the Curriculum involves behind-the-wheel instruction. Requisite experience, skill, and knowledge should make it unnecessary for anyone to be administered a full street instructional program.

However, there are several advantages in exposing instructors to the major elements of the Curriculum:

- They see the course from the student point of view.
- It gives them an opportunity to see what is to be taught.

- It gives them an opportunity to see various instructional methods being used.

- They can observe the administrative requirements imposed by the course content and methods.

For these reasons, the new instructor should be administered certain elements of classroom instruction, and street instruction.

Classroom Training

New instructors should take the entire classroom portion of the course. While the need is less apparent, assistant instructors should probably also take the classroom portion of the course. Although assistant instructors will not be called on to teach classroom segments, it's important that they have a mastery of the subject matter presented in the classroom so that they can deal with student questions and provide better learning experiences during range and street sessions (e.g., proficiency development).

Instructor lesson plans describe in considerable detail just what is to be taught in classroom instruction. The content of instruction could be obtained through a review of the lesson plans. However, requiring new instructors to obtain the information by participating in classroom instruction requires no more time and has the additional advantage of exposing instructors to (1) additional information amplifying that which appears in the lesson plans, (2) the instructional techniques employed by an experienced instructor, and (3) the manner in which students respond to the information and methods called for in the lesson plans. The last point is particularly critical. For example, most experienced long-haul tractor-trailer drivers are fairly knowledgeable in Hours of Service Regulations and do not need to learn how to fill out Daily Logs or Recaps. However, until they have sat through a classroom lesson, it will be difficult for them to fully appreciate the difficulties in communicating regulations to students and enabling them to prepare Logs and Recaps.

Since classroom instruction requires only about one week of time, it is no great financial burden in view of the potential return of ensuring a qualified staff. Classroom training can be offered new instructors in at least two ways:

(1) They can sit through the classroom sequence in its entirety.

(2) They can take the instruction out of sequence by cutting across different classes of regular students to get the subject matter within a short period of time.

Either approach appears reasonable. Major considerations in selecting an approach would include (1) how long it would take for a new instructor to be exposed to all portions of the classroom instruction; (2) short-term staffing needs; (3) the immediacy of need for a new hire to assume a full instructional load.

Superimposed on the need to learn the subject matter through classroom training is the need to learn how to handle administrative responsibilities that must be discharged in association with classroom training. These administrative responsibilities include student record keeping, ensuring the availability of instructional aids and equipment, and using instructional aids and equipment. These can be learned from experienced instructors who realize and understand both the administrative requirement and need to attend to those responsibilities to assure the efficiency of instruction and to assist the school administration in maintaining performance records on all students.

Range/Laboratory Training

New instructors and assistant instructors should participate in selected early range and lab lessons. Lessons from Units 1.4, Basic Control; 1.5, Shifting; 1.6, Backing; and 1.7, Coupling and Uncoupling would be the most appropriate range lessons. instructors and assistant instructors should be afforded the opportunity to participate in range and lab sessions, even though they may have the ability to perform the maneuvers called for, in order to get a feel for how range and lab sessions are actually conducted. How much time they spend on these activities is up to the administrator and depends on how quickly instructors can grasp the organization and methods of Lab and Range instruction.

The participation of instructors in these early range sessions can also give an indication of how proficient they are in terms of their driving abilities. Should deficiencies be revealed through the early range sessions, the instructors may participate in proficiency development as needed to hone their own vehicle handling skills. Participation in proficiency development can occur as part of regular Range sessions with scheduled students. Or, instructors can be notified of their deficiencies in these areas and required to develop their driving ability on their own time. If two or more new instructors are beginning, they should work together and follow the requirements of the lessons making up Unit 1.8 entitled Proficiency Development. Their joint participation allows them not only to develop proficiency as drivers, but to simulate the actual instructional requirements that they would later engage in.

It is very unlikely that new instructors will have developed skills in emergency driving maneuvers or in skid control and recovery. Even those individuals with many years of driving experience are unlikely to have acquired these advanced skills unless they have taken a specific course. Skills are the subject of Section 3, Advanced Operating Practices. They include Units 3.2, Emergency Maneuvers; and Unit 3.3, Skid Control and Recovery. Therefore, all new instructors should be required to participate, as students, in the advanced skill Units 3.2 and 3.3. It's important that this take place before instructors are assigned these units as their instructional responsibility.

Instructors should also be required to participate in Unit 1.3, Vehicle Inspection, as students before they are assigned instructional responsibilities in order to

- o experience the inspection requirements from a student point of view.
- o learn the inspection techniques required by the school.
- o be exposed to the rationale and methodologies that underlie the inspection requirements that are deemed important for safe operation.

Street Instruction

All instructors should participate as students in Street Lessons of Section 2, Safe Operating Practices, including Unit 2.1, Visual Search; Unit 2.2, Communication; Unit 2.3, Speed Management; and Unit 2.4, Space Management. Each of these units contain information about specific safe operating practices of which instructors may not be aware. The same is true of the Street lesson for Unit 3.1 Hazard Recognition. Instructors should participate in these street sessions in order to

(1) clearly understand the objectives set forth for each of the street sessions

(2) observe the teaching methodologies for attaining the objectives

(3) be exposed to the required level and type of interaction with student drivers and observers.

Instructors may also be exposed to safe operating practices as covered under Unit 2.5, Night Operation, and 2.6, Extreme Driving Conditions, although scheduling of the course or conditions may prevent their involvement. Instructors should be able to forego participation in Proficiency Development onstreet (Unit 2.7).

SUPERVISED TEACHING

A new instructor's first experience in any lesson should be supervised. The supervision may occur as a single class or across different classes. There's no particular preference to the sequence in which the supervised teaching occurs as long as it occurs before instructors are asked to perform independently in administering the course lessons.

The instructors should be supervised by an experienced instructor. assistant instructors can be supervised by either an instructor or another competent assistant instructor. Supervised teaching should take place for every lesson that is to be taught by new instructors. Each supervised teaching effort should be critiqued immediately following the lesson and another supervised teaching session should be scheduled and supervised if

the new Instructor fails to meet the standards for quality instruction established by the school.

Classroom Instruction

The classroom performance of Instructors, Assistant Instructors and Lecturers should be assessed relative to the following criteria:

(1) Their understanding of lesson content

(2) The accuracy with which they present technical information

(3) Their adherence to the objectives for each lesson

(4) Their compliance with the lesson plan content, methodology, administrative guidance

(5) Their efficient use of instructional time

(6) Proper use of instructional aids and other equipment

(7) Their interaction with students including their ability to deal with student learning and behavioral problems

(8) Management of the learning environment in a manner that facilitates achieving the course objectives

(9) The attitudes they convey toward the importance of the lesson under consideration, the trucking industry and the students both as individuals and as future tractor-trailer operators

(10) Their use of and compliance with instructional methods called for in each lesson

(11) Administrative items such as prior pre-class preparation, efficient administration during the lesson, and record keeping especially on student performance

(12) The way in which they handle student questions including their willingness to listen and to answer the questions completely

(13) Their effort and approach in making technical information understandable including the representation of information in a different manner if necessary

(14) Their approach to dealing with students who are experiencing difficulty in grasping content or performing exercises or applying safe operating practices

(15) Evidence of their desire to make sure that students are learning rather then merely being exposed to a requirement

(16) Their overall teaching style including any mannerisms (e.g., talking without looking at people, talking to the aids used in instruction rather than to the students, repeating pet phrases unnecessarily, such as "okay," "all right," etc.)

(17) Personal characteristics and teaching style including avoiding common instructor traps such as

- o being one of the boys
- o using sarcasm
- o bluffing through content
- o complaining about students or requirements
- o acting as a commedian
- o playing the role of a "hard guy"

Range and Lab Instruction

The following should be observed with regard to assistant instructors' performance of their support roles for range instruction and lab sessions during Section 1, Units on Basic Operation of the Vehicle, and for Sections 4 and 5, Vehicle Maintenance and Nonvehicle Activities, respectively, in which lab activities occur:

(1) Proper placement of equipment

(2) Timely and efficient placement of equipment

(3) Appropriateness of the type of assistance provided individual students

(4) Appropriateness of the timing of contacts made with individual students

(5) Quality of demonstrations given the students

(6) Compliance with lesson plan requirements, especially administrative requirements

(7) Compliance with requirements for security and storage of equipment

(8) The ability and willingness of both instructor and assistant instructor to play the appropriate roles when working together (assistant doesn't instruct; instructor doesn't assist)

(9) Ability to move directly from one exercise to another without having to study lesson plans

(10) Maintaining assigned student records accurately

Lecturers

Lecturers are selected for their specialty in a technical area and they should have no need for technical training. They, however, may need some form of supervised teaching in the form of monitoring. Their early performance should be monitored to make sure that they

(1) work within the lesson objectives.

(2) communicate technical information to students in such a manner that they can understand it.

(3) stick to the intent of the lesson plan (not including extraneous comments and information at the expense of information called for).

(4) are in general meeting the needs which gave rise to their selection and use.

IN-SERVICE IMPROVEMENT

The purpose of technical training and supervised teaching is to make sure that instructors and assistant instructors know the course content and can apply the methodologies that are specifically called for in the course at a level of competency that ensures students a fair opportunity to achieve the course objectives. However, there are a number of skills and techniques that cut across all units of instruction that can improve the overall quality of training. These skills and techniques, while not called for by specific units within the Curriculum, are capabilities and abilities of instructors that largely dictate the quality of instruction regardless of the methods or materials employed or the objectives to be achieved. Illustrative examples of these more general skills and techniques include the following:

(1) Communication style

(2) Presentation approach

(3) Techniques of demonstration

(4) Tips for the use of audiovisual aids

(5) Dealing with student questions

(6) Handling students who learn at different rates

(7) Dealing with the undermotivated/overmotivated students

(8) Integrating new information and techniques into existing lessons

(9) Enriching lessons through examples

(10) Using personal experiences to enhance understanding and recognizing the differences between well-placed personal experiences and "story telling"

(11) Using student examples or examples about students in order to communicate or reinforce a point.

Other topics could be identified as the various needs exist. Examples of other topics would include such things as identifying student deficiencies, use of videotape equipment to enhance instruction, and the use of instructor commentary for street lessons. Since it's impossible for Instructors to teach effectively without the benefit of such training, it may be most efficient to give instruction on a periodic basis to groups of Instructors rather than to individual instructors upon arrival. This can be done through extra-hour workshops and practice sessions given in the evenings or on the weekends.

Importantly, in-service training at this level shouldn't be confused with the school's overall in-service training program. In-service training at this level is designed to foster improvement on the part of the staff to bring them up to a level of qualification suitable for them to function in their instructor role. This initial in-service should not be confused with the general in-service program which has as its objectives skill maintenance and skill enhancement.

The subjects of instructor skill maintenance and enhancement are objectives of the in-service program of the school. Further discussion will be given to instructor skill maintenance and enhancement later in this section.

INSTRUCTOR SUPERVISION

The Curriculum is designed to produce a highly qualified student. If the contents of the Curriculum, or the way it is taught is allowed to vary from one instructor to another, the quality of the students will also vary. It is important that the contents and the methods of the Curriculum be adhered to if the Training Standards upon which the Curriculum is based are to be met.

To assure that the Curriculum is properly administered, instructors need to be closely monitored and supervised. The supervision must encompass the entire instructional staff--instructors, assistant instructors, lecturers. The responsibility of supervising assistant instructors is, of course, shared with Instructors. However, school administration needs to monitor both to insure that they are fulfilling their responsibilities and that they are interacting with one another to form a smoothly functioning team. This section will discuss both the scope, and the methods employed in supervising instructors in administration of the Curriculum.

SCOPE

Supervision of instructors must encompass the full range of instructor responsibilities including:

- o Instructional content
- o Instructional methods
- o Student evaluation
- o Recordkeeping

Content

The content of the Curriculum is provided in the lesson plans provided in the Instructor Manual. Instructors must be taught and motivated to adhere to the content of lesson plans. It is only through adherence to the prescribed content that attainment of the objectives for each unit of instruction may be assured. Failure to adhere to lesson plans can result in (1) critical items of content being overlooked or avoided, (2) extraneous subject matter being introduced, and (3) time being improperly apportioned among topics making up a lesson.

If instructors are to adhere to the content of a lesson plan, they must view it as a tool that enables them to conduct effective teaching. They must be encouraged to see the content of the Curriculum as being the result of a systematic training development effort, the result of which is to place in their hands the instructional content, the most critical elements necessary to enable a student to become a safe and efficient tractor-trailer driver.

Strict adherence to the lesson plan should not be viewed as inhibiting the instructor's initiative or spontaniety. Rather, it should be seen as a way of enabling them to become polished instructors. If the content of the lesson is allowed to change each time the lesson is given, instructors will never obtain mastery of the material. Consequently, they will have to devote as much of their effort to thinking about what they are going to say as to observing and reacting to what the students are doing.

The Curriculum lesson plans do not completely determine the content of instruction. They employ detailed outlines rather than a script. This was done in order to allow instructors to present the content in their own way. They are encouraged to incorporate their own experiences and that of their students into their instruction in order to make it interesting. Such freedom will inevitably lead to additional content. This is acceptable as long as the following conditions prevail:

> The content is relevant--The content must be relevant to the objectives of the Unit. There is no room in the Curriculum for "war stories" or content that is intended primarily to entertain.
>
> Methods must be appropriate--The methods employed during the lesson must be appropriate for handling the content. Instructors should not, for example, tie up BTW time giving lectures in the vehicle.
>
> The Instructor must be qualified--The instructor must be capable of delivering the content effectively. For example, instructors should not attempt classroom or range demonstration that they are not capable of performing expertly.
>
> There must be enough time--The content must not be allowed to crowd out other content called for in the lesson plan.

Methods

The methods selected for teaching the content of the Curriculum were selected on the basis of their ability to lead to the attainment of instructional objectives efficiently. Instructors should not be permitted to take great liberties with the methods that are called for in the lesson plans. If instructors are allowed to improvise, the result can be (1) a reduction in the quality of instruction, (2) a lack of uniformity, (3) failure of instruction from one instructor to mesh with that of another and (4) failure of instructors to achieve mastery of any method because of continual changes.

Like content, methodology is only outlined and not totally proceduralized. This is particularly true for classroom instruction for which lesson plans are primarily content outlines. The method by which instructors interact with students to help them gain insight and develop understanding are left largely to the instructors. Some will tend to use a one-way lecture type of delivery, while others will use a more socratic approach, leading students to "the discovery" of the information to be communicated.

While instructors are given a great deal of freedom in working out their own instructional techniques, they must be watched to make sure the following rules are adhered to:

The Method is Appropriate--Method must be appropriate to the content being delivered. Instructors must not put on demonstrations or engage students in exercises that tended merely to "enliven" the instruction.

Instructor Must be Qualified--The instructor must be capable of using whatever method is employed. Instructors frequently try to repeat some demonstration they've seen another instructor perform without having the knowledge or skill to do it effectively.

The Method Must be Controllable--Whatever method is important must be completely under the control of the instructor. Instructors often launch group discussions that end up with students reaching a conclusion that is contrary to what the instructor was seeking.

Time Must be Controlled--Introduction of a particular method must not extend the time devoted to a topic or exercise. In developing the Curriculum, several intriguing methods were bypassed because they were extremely time-consuming.

Student Evaluation

The supervision of instructors should include their activities in carrying out their prescribed evaluation procedures. The methods employed in evaluating the achievement of students is described under "In-Course and Final Examinations" elsewhere in this Manual. Two types of evaluation procedures are employed: subjective and objective. Each requires a somewhat different form of supervision.

Subjective Evaluation

Instructors are called upon to provide daily evaluations of student progress for attainment of course objectives. These evaluations are entered on the "Master Record" maintained by school administration. The Master Record is also used to record incidents of student learning or behavior problems.

By definition, subject evaluation are strongly influenced by the judgment of the people performing them. An important aspect of supervision is making sure that the evaluations are determined primarily by characteristics of the students rather than those of the instructor. In particular, instructors must be watched closely for evidence of the following:

- Failure of truckers to understand the nature of the rating and the meaning of terms employed.
- Instructors that are inadvertantly liberal or inadvertently severe in their evaluations, as evidenced by ratings which, on the average, differ markedly from those of other instructors.

- Instances in which an instructor appears to be overly liberal or severe toward a particular student, as evidenced by evaluations of that student that differ markedly from those by other instructors.

Subjective evaluations are needed due to the inability of purely objectively evaluations to anticipate and measure all important aspects of a student's performance. However, if they are to be successful, instructors must completely understand them and must attain some uniformity in the way they carry out the evaluation process. The means by which this difficult task can be achieved will be discussed in a moment.

Objective Evaluation

Objective evaluation is carried out under the Test Battery, which is described in the In-Course and Final Examination tests section of this manual. The tests that are employed are highly objective. They are also highly complex. The two go together in that attaining highly objective measurement, as evidenced by interexaminer agreement, necessitates the use of very strict evaluation procedures and criteria. Despite the instruction in test administration that is called for as a part of instructor training, instructors will invariably differ in their ability and willingness to adhere to the objective measurement system to be employed. The problem is likely to be most accute in administration of the Street Test because of (1) the variation in traffic conditions that prevails from one administration of the test to another and (2) the fact that no one witnesses administration but the student and the instructor.

Instructors who have not completely mastered test administrative procedures may not recognize that fact. Those that do recognize it, may not report it to the school administration but rather employ their own evaluation system. One result of instructor having generated evaluation procedures is a lack of validity. The objective procedures that make up these tests were developed from the Curriculum's instructional objectives through a highly systematic process. Instructors lacking the time and resources needed for systematic test development, are very unlikely to arrive at procedures that provide valid assessment of student performance.

Even were the instructor's procedures to be valid, they would not be the same as those employed by other instructors. The result is a nonuniform test system which is unfair to students.

Recordkeeping

The results of student evaluation must be entered on the student's Master Record in order that administrators can keep abreast of student progress and thereby identify students that need remedial instruction. Keeping records is not a favorite activity of most instructors. This would be particularly true for the subjective evaluation, which requires instructors to perform daily evaluations of each student relative to the attainment of attitude objectives. These evaluations will generally be performed at the end of the day,

when instructors are typically anxious to pack up and go home. Even consientious instructors, are inclined on occasion to defer the evaluation until the next day--when the student's performance is likely to be forgotten. A "daily" evaluation means just what it says, and instructors must be supervised closely to make sure that records are completed and turned in each day.

The Master Record is the only record that is designed specifically to support the Curriculum. Most schools require their instructors to complete a number of other records, including daily attendance, equipment records, personnel records, and so on. The same need for close supervision to ensure adequate record keeping applies to all records. Instructors must be given feedback on the adequacy of their record keeping. The feedback should cover both those aspects of their records that are adequate and helpful and those in which they are deficient. If deficiencies are not immediately brought to the attention of instructors, they will assume they are doing an adequate job. If no note is made in lapses in recordkeeping, instructors will tend to assume that they are unimportant and eventually stop completing them.

SUPERVISION TECHNIQUES

The exercise of proper supervision is a topic too broad to be adequately treated in this manual. The following discussion is confined to those technques that are particularly appropriate to supervising instructors in administration of the Curriculum. These techniques may be categorized as follows:

- Monitoring performance
- Discussions with instructors and students
- In-service training.

Monitoring Performance

The performance of instructors should be monitored on a regular schedule. This schedule may include pre-planned observations, in which the instructor is apprised, but also should include the unscheduled visits needed to observe the way instructors normally fulfill their responsibilities. Methods of observation include direct observation, video taping and record checks.

Direct Observation

Supervisors should make periodic unannounced visits to class and range sessions. Spot checks of street instruction is hard to arrange because of the limited space available in the cab. Rather than "bump" a student, it is best to wait until an occasion in which a student is unable to participate in a scheduled street lesson because of illness, remedial training or some other problem.

Video Tape Recording

Video tape recording is an effective way of capturing information on the performance of instructors. It has the following advantages over direct observation:

- It detects things that would escape both the instructors and supervisors eye in direct observation.
- It eliminates the need to write down observations; the video tape can be stopped at any point to discuss strengths or weaknesses.
- It reduces the likelihood of argument. instructors often fail to recognize some of the things they are doing and are suprised to witness them on tape.
- It provides a good means of enabling instructors to improve their performance.
- It is often less obtrusive than a supervisor (particularly when supervisor is taking notes), and takes up less room where space is limited (e.g., street instruction).
- It allows the instructor's performance to be reviewed with the administrator at any convenient time, even days later without loss of detail.

Records

In the case of the student evaluation and record keeping functions, the instructor's performance can be assessed through spot checks of the records themselves. Spot checks of records will reveal many of the deficiencies mentioned earlier, including incomplete or improperly filled out records, misunderstanding of evaluation procedures, and overly liberal or overly severestandards of evaluation.

Discussions

Discussions with instructors and students are valuable in supplementing the performance monitoring just discussed. They should never be used by themselves.

Discussion with Instructors

Periodic meetings of the instructional staff should be held to review all aspects of instructor performance. If handled properly, discussions can provide a less threatening form of feedback to individual instructors and meetings with supervisors or administrators. Thus, it is often easier to accept criticism from one's peers than from one's superior. Secondly, recognizing that all instructors have their strengths and weaknesses makes any criticism easier to bear.

In addition to providing a good system of feedback, discussions among instructors provide a way of achieving uniformity in making subjective appraisals. If the performance of individual students is reviewed on a weekly basis, instructors will have an opportunity to perceive how other instructors view the performance of each student. Supervisors should make sure instances in which instructors give widely discrepant evaluations are specifically addressed. These instances will help reveal the differences in criteria employed by different instructors. Care should be taken, however, to make sure that the attempt to reach a consensus is confined to the criteria and not to the students. instructors should not get the idea that they are being pressured to change their perceptions of the students.

Discussions with Students

At least once during the administration of a course, students should have an opportunity to discuss their views of the instruction they are receiving, and the instructors providing it with the school administration. Discussions with students provide an opportunity for school administration to gain insights into student perceptions of instructors and Instruction. Obviously, what students say cannot be taken at face value and acted upon. Students do not always know what underlies the actions of instructors and the instruction they are receiving. However, when a number of students identify something as either an asset or liability, they are certainly worth listening to.

Instructors should not be present during student discussions involving them. The presence of an instructor is almost certain to inhibit free expression by the students. And, even the most thick skinned instructor will find it difficult to remain quiet in the face of what amounts to criticism. However, if instructors are to ultimately benefit from the results of discussion, those results must be conveyed to them. This can be done either individually or collectively during periodic staff meetings. Again, a collective review is likely to be less threatening so long as all of the instructors share to some extent in the criticism. The student's comments should be conveyed matter-of-factly (with some editing to delete the more emotional and distructive criticisms) simply as representing the way in which instructors are perceived by the students. Instructors may or may not act upon the information, as they see fit.

An additional benefit of discussion with students is the opportunity it offers for them to register complaints. Since this aspect of discussion has nothing to do with supervision, it is outside the scope of the present discussion. However, it is mentioned only because it represents an additional reason for holding discussions.

IN-SERVICE TRAINING

The discussion of supervision up to the present point has focused upon instructor inadequacies and ways of identifying them. The most effective supervision is that which prevents inadequacies from arrising in the first place. This is best achieved by an ongoing program of in-service training.

In-service training was described earlier as a part of the instructor training process. The purpose of such training was to bring instructors and assistant instructors up to a level of proficiency that enables them to meet their responsibilities as instructors. Regular in-service training as an element of supervision is intended to raise proficiencies levels to the highest levels attainable, a goal that can only be achieved after instructors have gained experience in teaching the Curriculum. Specifically, in-service training should be devoted to improving the following:

- Classroom presentation techniques and the ability to lead problem solving exercises and classroom discussions.
- The ability to operate the vehicle in order to provide Range demonstrations.
- The use of the commentary driving technique in conducting Street demonstrations.
- The ability to administer Range and Street tests smoothly and quickly, with minimum recourse or printed materials.
- The accuracy, completeness and promptness of record keeping.
- Understanding of advances in vehicle technology and design.

In-service training can be provided both through the school and outside resources.

In-service training within the school can be handled both through regular staff meetings and through sessions scheduled specifically for training purposes. Staff meetings would be used primarily to address specific problems that have come to the attention of the school administration. Attempts to improve skill in teaching or evaluation more broadly, or to introduce new content and techniques, would require more time and are more appropriately the subject of special workshops or training sessions held outside of regular school hours, e.g., evening or weekend. Efforts to improve instructor proficiency through outside sources should also be encouraged. Such sources would include:

- college and university courses
- seminars and workshops put on by colleges, governmental agencies, professional societies, and commercial firms
- special programs put on for the school by commercial firms

INSTRUCTOR ASSIGNMENT

Instructor and assistant instructor assignments must give consideration to the breadth of participation in various methods and the number of students assigned to each method. Primary objective is to get the best overall performance from available instructional staff.

GENERALISTS VS SPECIALISTS

The most important issue in assignment of instructors is whether they will be assigned as specialists, i.e., assigned only to certain methods of instruction or as generalists, i.e., assigned to all methods of instructions. The purpose of the discussion here is not to take a side but rather to point out the advantages and disadvantages of either approach. The final decision utilizing instructors should not be dictated by a predisposition to the use of specialists or generalists but rather should be guided by the need to utilize existing instructional personnel in a way that will secure the best mix of talent for achieving course objectives in a cost-effective manner.

Specialized Assignments

The advantage of specialization is that instructors can be confined to teaching in areas of their greatest strength. For example, instructors with good communication skills could be utilized most heavily in the classroom, while those with good driving skills and a propensity for giving Range instruction could be used to carry the major burden for Range instruction. While this approach utilizes the instructors in their recognized strength, it also has the advantage of exposing students to the best available instructor for each method of instruction.

Because of the technical nature of classroom instruction and the structured nature of in-vehicle instruction, some degree of specialization is needed. Classroom instruction should be assigned to those instructors who know the subject matter extremely well, and can conduct classroom instruction effectively, including presenting information and merging classroom exercises and problems which depend upon a high degree of student and instructor interaction. In turn, instructors may be able to handle Range and Street instruction while lacking communication skills needed for classroom instruction.

Specialization should not occur to the extent that teachers in one method of instruction fail to understand what is occuring in the other. Specialization to the extent that an instructor is ignorant of any method should be avoided for the following reasons:

- Instructors lose appreciation for what is occurring in the other methods of instruction.

- Instructors teaching only in one method tend to overteach (they teach everything they know whether it's needed or not).

- Instructors may unwittingly communicate to the students that their method of instruction is more important than any other.

- Instructors like anyone else need some variety in order to overcome routine job boredom.

Generalized Assignments

The ideal would be to have a staff capable of functioning in all phases of instruction equally well. Such an ideal is, of course, unattainable. However, it is possible to make assignments in such a way that Instructors gain the experience to function as generalists. The advantages of assigning staff as generalists are many:

- It permits greater flexibility in handling overloads of students and distributing the workload more evenly across teaching personnel.

- It enables instructors to track students through the various methods of instruction, thus permitting more accurate assessment of student performance and student record completion.

- It gives instructors firsthand information (as opposed to recorded information) on overall student strengths and weaknesses.

- It tends to encourage instructors to stay more abreast of new ideas in the entire field of truck-driver training.

- Schedules are less likely to be affected by administrative problems such as absenteeism, requirements for individual contact or counseling sessions with students, company needs for instructors to perform in roles beyond their instructional requirements.

The disadvantage of assigning instructors as generalists, already stated, is that few instructors are equally qualified to teach in all methods of instruction.

Optimal Assignment Pattern

The optimal pattern of assignment for any school would depend upon the capabilities of its staff. Where the staff is broadly qualified, it will be advantageous for the school to use instructors as generalists in order to gain as many of the advantages of the generalized assignment patterns as possible. However, regardless of how broadly qualified they are, all instructors will be better in some areas than others. Their assignments should reflect their strengths.

Regardless of the assignment pattern employed, all instructors must be able to conduct Street training. Because of the low student-vehicle ratio involved in Street training, there will be times when all students are in vehicles and all instructional personnel must be committed to behind-the-wheel instruction. Moreover, participation in Street instruction gives those instructors who commonly spend most of their time as classroom and range instructors, a better perspective of student needs and deficiencies. This experience can be utilized to both enhance instruction for the group of students being processed in the course as well as permitting modifications to be introduced into range and classroom for future training groups.

In summary, whether a school elects to employ a specialization or generalization staffing pattern, largely depends upon the talents available to the school with the exception that all instructors are both aided by and should be involved in Street training sessions.

Assistant Instructor Assignments

Assistant instructors are not permitted to teach classroom instruction, unless under direct supervision of an instructor. However, within behind-the-wheel instruction, their time may be divided among Range instruction, Street instruction and administration of mid- course, final range test, and final on-road test. As in the case with instructors, there will be times in which all assistant instructors are needed for onstreet in order to manage the heavy load of students requiring Street training, within a reasonable period of time. However, beyond responding to the requirement for Street instruction, assistant instructors may be used as specialists or generalists.

The assignment in which specialization would be of greatest advantage is in administration of the Range Test and the Street Test. A high degree of reliability must be achieved in the administration of these tests. This can only occur when an instructor is totally familiar with the procedures for test administration and totally accepts the need for accuracy and objectivity in the administration of the test. One can only achieve proficiency in administering the test through repeated opportunities in test administration.

Assignment of Lecturers

Lecturers are selected because of their specialization in a technical area. It goes without saying that a lecturer should not be selected in an area in which they do not have a high level of technical competency. Training standards prohibit the use of lecturers to teach in more than a single technical area.

STUDENT/INSTRUCTOR RATIOS

The Curriculum employs different student/instructor ratios in each mode of instruction. Recommended student/instructor ratios are as follows.

CLASSROOM	BASIC RANGE	ADVANCED RANGE	STREET INSTRUCTION	LAB
12:1	6:1	12:1	3:1	(Variable)

Classroom

While the BMCS Standards permit a ratio as high as 24:1, a 12:1 ratio is recommended for the Curriculum. This ratio is recommended in consideration of interaction, aids and integration of modes.

Interaction

The Curriculum requires a highly interactive form of classroom instruction. Interaction is required between student and teacher and between student and student in a number of the classroom exercises. A ratio of 24:1 or greater is entirely appropriate for lecture presentations. However, interaction is difficult to maintain with more than 12 students at a time. What interaction that does occur fails to involve the entire class.

Use of Aids

Classroom instruction in the Curriculum relies heavily on the use of aids, visual aids, and other types of equipment and devices. The use of aids, especially the use of models and vehicle parts, as recommended for the Curriculum requires students to be close to the aid in order to be able to see what the instructor is trying to communicate through the use of the aid. To observe and gain communication from the aid, the class size must be reasonably small. For example, it isn't likely that two dozen students clustered around a model of a brake drum could see what the instructor was trying to point out.

Integration of Modes

Effective learning requires close integration of classroom and behind-the-wheel instruction. Information presented in the classroom should be put into practice as soon as possible in order that (1) students won't forget the information and have to be reinstructed, and (2) the information only reinforces pending being put to use. Achieving this integration requires scheduling Lab, Range, and Street instruction to occur as soon as possible after classroom instruction dealing with the particular topic.

The higher the classroom student/instructor ratio, the more difficult it is to achieve integration. For example, consider a 24:1 classroom student/teacher ratio. Upon completion of a classroom lesson, the 24 students would be ready to take the corresponding Street lesson. Given the 3:1 student/instructor ratio employed in Street instruction, eight instructors would have to be available to accommodate the students. Few schools have such large numbers of instructors available to handle a single class of students. The alternative is to conduct the Street lessons in sequence, thereby creating a gap between classroom and Street instruction.

A 12:1 student/instructor ratio would allow a group of students emerging from classroom instruction to be handled by only four street instructors. While providing for an effective integration of class and behind-the-wheel instruction, a 12:1 ratio would work a hardship on few schools since few enroll more than 12 students at a time. Even where they do, larger groups could be divided into two classroom segments without any great difficulty since classroom instruction is the most inexpensive method of instruction employed in the Curriculum.

Basic Range

Range instruction in basic vehicle control, as taught in Section 1 of the Curriculum will be referred to as "Basic Range" and employs a different student/instructor ratio than the Advanced Range to be discussed next.

Student/Instructor Ratio

For Range instruction, the student/instructor ratio is a product of

- o student/vehicle ratio--the number of students per vehicle.
- o vehicle/instructor ratio--the number of vehicles the instructor will supervise.

In Range instruction, the instructor is primarily directing the activities of a student driver operating a vehicle around the Range. It is really the vehicle/instructor ratio that is of importance. The BMCS Standards permit no more than a 3:1 vehicle/instructor ratio. However it also permits an assistant instructor and an instructor to collectively supervise four vehicles. This means a vehicle/instructor ratio of 2:1, with two vehicles

operating under the direct supervision of an assistant instructor and two more operating under the direct supervision of the instructor. It is the latter 2:1 ratio that is employed in the Curriculum. The 2:1 vehicle/instructor ratio allows closer supervision than a 3:1 ratio. Yet, because of the lower salary of an assistant instructor the overall cost is not much greater than a 3:1 ratio using only full instructors.

With a 3:1 student/vehicle ratio and 2:1 vehicle/instructor ratio, the student/teacher ratio would be 6:1. There would be six students for the assistant instructor and six for the instructor. Four students would be instructed behind-the-wheel at a time while two additional students per vehicle would be observing and awaiting their turn for instruction. While the BMCS Standards do permit a higher ratio, it is not recommended.

Observer Students

Since it is the driver of the vehicle who is primarily receiving instruction, the vehicle/instructor ratio is far more important than the student/instructor ratio. The students in the vehicle observing the driver, or standing along the edge of the range observing the vehicle, obviously are not receiving the same amount of instruction as the driver of the vehicle. However, so long as they are observing, they are learning:

> Exercise Procedures--Observing the way in which an exercise is performed reduces the time that it takes to acquaint observers with the exercise when they become drivers.
>
> Driver Performance--By observing the correct and incorrect performance of the driver, they are likely to evidence a higher level of initial performance and/or more rapid learning than their predecessors.

It is on the basis of learning through observation that the BMCS Standards permit the number of behind-the-wheel hours of range instruction to be offset by time spent in observation.

Exceptions

There are two minor exceptions to the vehicle/instructor ratios that generally prevail in Basic Range instruction. The first applies to Unit 1.4, "Starting the Engine and Putting the Vehicle in Motion". In these exercises,it is best to permit only one vehicle to be operated at a time. One of the vehicles would remain idle while the instructor supervises the driver of the other. The basis for this one-to-one ratio is the need to provide a margin of safety for students who may be somewhat nervous or excited over their first experience in starting and moving a heavy vehicle.

The second exception involves Unit 1.8, "Proficiency Development". During the last third of Lesson 2, the vehicle/instructor ratio may be raised to 4:1. Thus, during the last 12 hours of that Lesson a 12:1 student/instructor ratio is permissable. This ratio is of course, contigent upon students meeting prior Unit objectives and the availability of a facility of sufficient size to support the independent operation of four vehicles simultaneously. Also, a communication system would have to be available so instructors could provide guidance and cautionary comments without making direct face-to-face contact with the student.

The responsibility of instructors during Range instruction includes the following:

- o Supervising the setup of range exercises, including the placement of: barricades, etc.
- o Explaining and demonstrating the maneuvers to be performed in an exercise.
- o Explaining and demonstrating the driving techniques to be used in performing the exercise.
- o Observing and critiquing driver performance for both the drivers and observers.
- o Exercising general traffic control to prevent vehicles from endangering one another.

Advanced Range

Range instruction as specified in Units 2.3, 2.5, 2.6, 3.2 and 3.3 of the Curriculum are referred to as "Advanced Range" and specify different ratios than the "Basic Range."

Student/Instructor Ratio. Instruction in the "Advanced Range" units requires a 1:1 vehicle/instructor ratio, because of the potential hazards in performing the required exercises without close supervision of student drivers. To reduce operating costs, a 12:2 student/instructor ratio has been recommended. The basis for this ratio is the required limit of one student in the vehicle at a time, always accompanied by an instructor (except for a portion of Unit 2.5 "Night Operation"). This leaves 11 students in an observer status outside the vehicle who must be accompanied by an assistant instructor. The reasons for keeping student observers outside the vehicle are (1) the sometimes severe motions that the vehicle will experience during certain maneuvers, and (2) observers can see far more of what is happening from outside the vehicle. It should be noted that the 12:1 ratio is only recommended and any school that can provide a lower ratio is urged to do so, to improve quality of training.

Student Observers. To avoid wasting time, student observers must be learning from their observation. This shall be accomplished by providing them with a "running commentary" as each vehicle maneuvers through an exercise. This is done by having observers standing beside a radio receiver, at a safe distance from the maneuvering area. The radio receiver must be capable of picking up all communications between instructor and student within the vehicle on the range. Additionally, the instructor provides comments upon what is happening and why, for the observers. This instruction must be enhanced by having an assistant instructor positioned with the observers to provide them with more elaborate instruction than merely listening to the broadcast comments. Use of an assistant instructor provides an additional benefit, because the instructor in the range vehicle can reduce the amount of comments necessary (to aid the observing students) and thus concentrate more fully on instructing the student driver.

Since only one vehicle can safely execute an Advanced Range maneuver at any one time, the number of vehicles is necessarily limited, regardless of range size. Up to 4 vehicles may be utilized, with 3 vehicles returning from or getting set up for a maneuver. With more than 4 vehicles, too much time is spent in waiting to perform a maneuver.

Instructor responsibility during Advanced Range instruction includes everything required in Basic Range instruction, plus the following:

- Instructors always ride with the student driver for safety reasons.
- Instructors regulate entrance and exit from maneuvering areas to prevent mroe than one vehicle being on range at a time.
- Instructors strictly regulate vehicle speed at all time.
- Instructors provide both instruction and immediate feedback to student drivers on their performance.

Street Instruction

While the Standards permit other ratios, the Curriculum is based on a 3:1 student/instructor ratio for street instruction. This ratio is recommended as the safest, most cost efficient ratio, consistent with maximum student learning. With the 3:1 student/instructor ratio an instructor occupies the right front seat, one student is behind the wheel and two students are in the sleeper berth area (as observers) at all times. The vehicle pulls out of traffic periodically to allow students to be rotated from observer to driver position

Because the instructor is in the vehicle, a 1:1 vehicle/instructor ratio prevails in Street instruction. For there to be a true 3:1 student/instructor ratio, the observers must be actively engaged in instruction. Under the Curriculum, the participation of observers in the learning process is maintained by requiring them to observe and record driver performance, and to participate in a critique each time a driver finishes a stint at the wheel.

The responsibilities of the instructor during Street instruction include:

- o directing the driver around the training routes
- o regulating frequency and duration of student's turns behind the wheel
- o observing and critiquing driver performance
- o making sure that observers are learning by observing, recording and critiquing the driver's performance
- o providing demonstrations of specific safe and fuel efficient operating practices
- o providing an oral commentary during driving demonstrations where necessary to reveal what the instructor is responding to
- o handling questions raised by students as various road and traffic situations arise
- o exercising sufficient supervision and control of the student driver to assure their safety and that of other road users

Lab

The recommended ratio for each lab lesson varies according to such factors as subject matter and equipment available. See individual lab lesson plans for recommendations.

VEHICLE EQUIPMENT REQUIREMENTS

Several tractor and trailer combinations are required to support the Curriculum for Tractor-Trailer Drivers. While most vehicles may be utilized in their normal configuration, some minor vehicle modifications are required. A listing of vehicle equipment items and modifications is provided in the following paragraphs.

Tractor Requirements

Number of Tractors

The number of tractor-trailers required is directly dependent upon the number of students to be trained in school at any one time, the proportion of their time spent in the vehicle, and the student/vehicle ratio. The number available should provide for a student/vehicle occupancy ratio of three-to-one. This allows one student to drive, the instructor to occupy the right side passenger seat, and two students to observe. Given the in-vehicle time and the 3:1 student/vehicle ratio of the Curriculum, a total of 4 tractors is required for each class of 12 students.

At least one-half of the tractors should be configured for street operation. These vehicles must meet applicable State and Federal requirements for operation on public roadways:

- State registration
- Payment of use taxes and other special taxes
- Inspection requirements
- Safety and auxiliary requirements
- Insurance.

The other half of the vehicles may be relegated solely to Range training and need not be registered, pay use taxes, or carry the same level of insurance coverage as "street-legal" vehicles. However, all tractors must be in good mechanical condition and meet minimum safety requirements. All vehicles must be equipped with occupant restraint systems.

Any school that possesses only four vehicles (i.e., has only 12 students in school at one time) should configure all vehicles for street operation. If only two vehicles were "street legal," the need to divide students equally between Range and Street sessions would create a difficult scheduling problem. However, with multiples of 4 tractors, the fact that one class will be working primarily on the Range while another is working primarily on Street would allow half the vehicles to be confined to Range use, obtaining the economy that this permits, without creating scheduling problems.

Tractor Types

Both cab-over-engine and conventional tractors are required to familiarize students with important differences, such as:

- Handling characteristics
- Turn points
- Turning radii
- "Front-view" perspective.

No specific ratio of one type to the other is required, as long as students have an opportunity to become familiar with the unique characteristics of each.

Engines

Three general engine types are required: diesel (both two and four-cycle), and gasoline. At least one of each should be available in the fleet. However, no more than one gasoline engine need be provided, regardless of the size of the training fleet. At least one tractor engine should be equipped with an engine brake retarder.

Transmissions

As a minimum, the following transmission configurations should be available for training:

- Multi-range transmission, e.g., 9-speed, 10-speed, 13-speed
- Auxiliary gearbox, e.g., 5-speed main with two- or three-speed auxiliary transmission
- Multi-speed drive axles, e.g., 5-speed main with 2-speed rear axle.

These transmissions should provide a range of speeds from seven to thirteen.

Drive Axles

At least one tractor in the fleet should be equipped with a single drive axle, and at least one with a twin-screw axle.

Suspension Systems

At least one tractor should be equipped with a standard leaf spring suspension system and at least one with an air cushiontype suspension.

Street Vehicle Requirements

Vehicles to be used for Street instruction have several unique equipment requirements, including sleeper modifications, special displays, communications equipment, and safety equipment.

Sleeper Modifications

The sleeper berth must be modified to accommodate a minimum of two student observers. This can be accomplished by installing a bench seat in the sleeper berth. If possible, the sleeper floor should be lowered approximately 6 inches to provide student observers with an improved view of the road. Additional requirements are described below:

- The seating arrangement must provide student observers with a clear view of the road, the tractor instrument panel, and actions of the driver.
- The seat must be rigidly secured to the sleeper berth floor and sufficiently padded to prevent injury to the occupants during sudden or unexpected maneuvers.
- The seating area should be as comfortable as possible to reduce fatigue during relatively long in-vehicle training sessions, and should be adequately ventilated and equipped with viewing ports to provide student observers with a clear view of the road.
- Restraints (as a minimum, lap belts) should be provided for all seating positions and be firmly secured to the floor of the sleeper berth area.
- Seating accommodations should be designed to facilitate entry and exit by student observers.
- Where possible, grab bars should be affixed to the sleeper interior to provide a secure handhold for entry and exit.

Special Displays

A mirror (either portable or fixed) should be attached to the top of the dash panel or some other part of the tractor to permit the instructor to monitor student eye movements. An additional mirror should be attached to the visor over the driver's seat to allow observers to monitor eye movements.

At least one convex mirror should be mounted to the right side mirror bracket to permit the instructor to monitor right-side trailer position during curves and turns. If possible, a separate tachometer should be mounted in view of the instructor's seat position to allow accurate monitoring of student performance during upshifts and downshifts.

At least one tractor (used for Range training) must be equipped with an air brake pressure application guage to aid students in learning to make smooth, controlled stops.

Safety Equipment

All vehicles involved in over-the-road training will be equipped with those equipment items specified in Part 393 of the Federal Motor Carrier Safety Regulations:

- Fire extinguisher
- Fuses
- Emergency flares
- Emergency reflectors
- Warning flags

Each vehicle shall also be equipped with the following items:

- First aid kit--containing equipment sufficient for the treatment of small cuts and lacerations, severe bleeding, minor burns, etc.
- Snow tire chains
- Safety cables/chains--to be used for towing of stuck or damaged vehicles.
- Vehicle log book--for documenting trip length, destinations, maintenance activities, and repair requirements.

Communication Equipment

Each vehicle should be equipped with a citizen band radio, permitting communication on all 40 designated CB channels (or other type two-way radio or radio telephone). It should not be a single-side band (ssb). Radio should be equipped with as long an antenna as possible for maximum range. Extremely short antennas should be avoided as they restrict transmission range to less than 3 miles under nominal conditions. Radios must be properly licensed.

Range Vehicle Requirements

Equipment requirements for Range vehicles are less stringent than those to be used in Street operation.

Safety Equipment

Because vehicles are operating in a confined area, most items of safety equipment need only be kept in the Range area rather than on each vehicle (see Range Equipment). However, each vehicle must be equipped with a fire extinguisher.

Communication Equipment

All vehicles should be equipped with CB or other type of two-way radio or radio telephone equipment. Since only one-way communication is really necessary, receiving units are sufficient. They should, however, be equipped to receive 40 channels. Radios must be properly licensed.

Skid Equipment

Equipment items that may be added to vehicles utilized in skid recovery training includes an instructor trolley brake, antijackknife device, a light bar and skid tires.

Instructor Trolley Brake

A separate trolley brake mounted in a position accessible from the right side seat may be used by the instructor to "lock" rear tractor or trailer wheels to induce skids. In some skid recovery programs, the instructor is provided hand brakes that can selectively brake trailer wheels, drive wheels, and front wheels, individually or in combination with one another, to induce various types of skids. While independent braking systems are advantageous, they are not necessary in conducting skid recovery training, as it is taught in Unit 3.3 of the Curriculum. Skids may be induced simply by having students apply the brakes themselves, the condition that will induce braking skids in normal operation. Since the steering and braking responses required for skillful skid recovery do not depend greatly upon the way the skid has been induced, independent braking systems are not mandatory.

Antijackknife Device

Used to control trailer jackknifing during skid training. No specific type of device is required. However, any device should have the following characteristics:

- It should not prevent a jackknife, but only excessive trailer tilt and damage to tractor or trailer. The trailer must be free to jackknife in order for students to learn.
- Actuation of the jackknife limitation device must not require a response on the part of the students that is contrary to what is being learned. (Some devices require that the brake be fully applied--a response that is contrary to skid recovery.)
- The antijackknife mechanism must not influence vehicle handling characteristics in a way that would interfere with instructional requirements.

Presently, only fifth wheel devices, that is, devices that restrict the trailer from striking the tractor's cab seem to meet these requirements.

Light Bar

A light bar or other flashing beacon should be mounted on the skid-pan training vehicle. It should be amber in color and visible in normal daylight from a distance of 500 feet.

Skid Tires

Either treaded or treadless tires may be used on the tractor drive axles and/or trailer rear axles for skid training. Tractor steering axle tires should be treaded and in good condition.

Treadless trailer or tractor drive axle tires have the advantage of allowing skids to occur at relatively low speeds. (Note: Tractor or skid training vehicle should be single drive axle rig.) Treaded tires on skid vehicles have several advantages:

- o Longer service life thus requiring fewer tire changes.
- o Greater safety as treadless tires are likely to "blow out" during skid training.
- o Provides driver with degree of control available in most "real world" skidding situations.

Other Equipment

Other required equipment:

Tiedowns--various types of tiedowns for securing trailer loads should be available for instructing students in their installation and adjustment. Included are

--ropes
--cables
--chains with slack adjusters
--nylon webbing

Wheel chocks--for chocking rear trailer wheels

Spare wheel/tire--mounted on rim and inflated to proper pressure

Trailer Requirements

Two general types of trailers are required for training:

- o Box trailer
- o Flat bed trailer.

Three additional special trailer types are required where specialized training is provided. These are tank trailer, refrigerated trailer and a set of 28-foot double trailers (including converter gear).

Trailer Axles

At least one trailer should be equipped with a single axle and at least one equipped with sliding tandem axle.

Trailer Length

Box trailers and flat bed trailers of 40-foot lengths are required for training. Doubles, where used, should be at least 28-feet in length.

Trailer Cargo

Sufficient "dummy cargo" to load trailers to maximum rated capacity should be available. The most appropriate type of cargo is bulk scrap paper bales. However, anything of a similar nature is acceptable. Equipment for loading and unloading cargo as required should also be available.

NOTE: Unit 2.7 requires at least 35 hours of Street training time with trailer loaded to a minimum of 15,000 pounds of cargo.

RANGE EQUIPMENT REQUIREMENTS

Effective Range instruction requires the use of exercise markings, communication equipment, and support equipment.

Exercise Markings

A variety of devices may be used to mark paths and points (braking points, turning points) for Range exercises. At a minimum, the items below must be provided. The numbers indicated represent the quantities required to support classes involving 12 students and 4 vehicles.

Barricades

Four fixed barricades 4' in height and 10' in width are required. They may be constructed of 1 x 4's or other suitably sized lumber. While barricades may be larger than these minimum dimensions, they should not be smaller. A 10' minimum width is required to permit the driver to view both edges of the barricade simultaneously through the left and right rearview mirrors.

A 4' minimum height is required in order for the barricade to be in view of the mirrors at all times. Barricades shorter in height cannot be viewed in rearview mirrors under all circumstances.

Stanchions

Twelve stanchions are required. They are used to mark Range maneuver boundaries, critical points, turn points, etc. Stanchions may be constructed of 24-inch traffic cones in which a 4' dowel, 1" in diameter, is

inserted. (A height of 4' is needed to assure visibility.) A red or orange vinyl flag is attached to the upper end of this dowel. Stanchions constructed in this manner, in addition to being highly visible, and portable and resistant to damage.

Barrels

A minimum of three barrels is required. Barrels used shoudl be 55-gallons in capacity. Barrels should be used as pylons in serpentine range maneuvers where there is a high likelihood that the marker will be struck, to mark critical points (e.g., turns, chuck holes), and to barrels more visible it is a good idea to use 6 barrels and have them welded (head to head) in pairs - thus giving 3 extra high barrles. These should then be painted "day-glow" orange for extra visibility.

Traffic Cones

Ten dozen traffic cones 24-inches in height, are needed for constructing stanchions and marking exercise paths.

Curbings

Fifty feet of curbing is desirable for parking exerciese, since it doesn't require resetting as do cones. Curbing can consist of railroad ties, portable concrete curbing, or other similar material. It should be a minimum of 8 inches in height.

Communication Equipment

Equipment must be provided to allow instructors to communicate clearly with student drivers. It is unnecessary for students to be able to communicate with instructors, although there is no reason to prevent it.

Walkie-Talkies

Hand-held CB radion units can be provided for each member of the instructional staff to permit direct communication with students from instructor viewing platform or other areas of the range. These walkie-talkies need not have full 40-channel capability, but should have at least 4 frequencies available to permit more than one instructor to communicate with students without confusion.

Any instructor responsible for supervising more than one vehicle at a time should communicate with all drivers over the same channel, identifying each vehicle by number, e.g., "Vehicle #2 stop and wait for vehicle #1." This permits the instructor to communicate with any driver in an emergency without having to switch channels. Different instructors would, of course, use different channels.

This system will of course require portable magnetic signs for both doors of each tractor and a smaller sign for the dashboard (excited students often forget their rig numbers on the Range).

Visual Communications

Lacking a radio, it is possible to communicate with drivers by means of hand signals. If this approach is used, however, students must be given instruction and drill in the interpretation of hand signals.

If visual communications are to be used, a viewing platform should be erected in a position that will allow Instructors to observe students, and vice versa. A platform 8' by 8' at a minimum of 6' in height will suffice.

Audible Communications

Audible communications, such as bull horns and whistles, have been used to supervise Range instruction. This form of communication is not recommended for Range instruction under the Curriculum. The noise of tractors makes audible signals extremely hard to hear and does not permit the clarity of communication required by the exercises called for under the Curriculum. Moreover, unless the Range facilities are extremely remote, the decibel levels needed to override vehicle noise is likely to violate noise abatement ordinances and result in complaints from nearby residences and businesses.

Range Support Equipment

A variety of equipment items beyond those already mentioned are needed to support Range instruction. Key items include the following:

Auxiliary Power Unit (APU)--Or other system which permits jump starting of Range vehicle. Dead batteries are a common problem because of the low speeds that characterize Range operation. The advantage of a portable system is that other Range vehicles used in training are not tied up unnecessarily in order to jump start vehicles with dead batteries.

Forklift--For loading/unloading dummy cargo.

Fire Extinguishers--A minimum of one each CO_2 and dry chemical pressurized fire extinguishers are needed. Dry chemical extinguishers are suitable for extinguishing clothing fires and other fires not associated with mechanical equipment. They should not be used on engine fires because penetration of dry chemical components into the engine damages various engine components. CO_2 extinguishers should be used for engine fires only.

Spray Paint--For touching up Range exercise markings (see "Range Facilities" under "School Facilities" section of this manual). At least one can of paint for each color used in the Range layout.

Tape Measure--100' steel retractable tape for setting cones and measuring Range maneuver dimensions.

Numbers--Large numbers should be displayed on the side of the vehicle to permit identification by the instructor. The same number should be placed inside the vehicle. The numbers may be temporarily or permanently affixed (e.g., painted on).

MAINTENANCE EQUIPMENT REQUIREMENTS

Support of both Street and Range instruction requires suppplies and servicing equipment for maintenance of vehicles.

Supplies

The following supplies are needed for maintaining vehicles used in Range and Street instruction.

- Lubricating oil and grease for
  --engine lubrication
  --wheel/axle lubrication
  --transmission lubrication
  --transaxle/rear end lubrication

- Air, oil, fuel, and water filters

- Headlamps, reflector light bulbs, marker light bulbs, lenses, and common reflectors

- Battery cables and battery charger

- Ignition replacement parts for gasoline engines:
  --Spark plugs
  --Condensers
  --Distributor caps
  --Spark plug wires
  --Points
  --Distributor rotors

- Engine coolant and antifreeze

- Spare batteries

- Mounted tires--A sufficient supply of mounted tires for all tractor and trailer wheels should be maintained

- Tire gauges for measuring:
  --Air pressure
  --Tire diameter
  --Tire width
  --Tread depth

Servicing Equipment

Owners manuals and ordinary mechanic's tools should be available to permit owner servicing of vehicles. It is rarely efficient for schools to perform higher level maintenance, such as engine diagnosis and major repairs. For this reason, shop manuals, diagnostic equipment, and specialized tools should be unnecessary.

INSTRUCTIONAL MATERIALS

A variety of instructional materials are required to support instruction. These instructional materials include classroom furniture, instructional aids, and instructional devices.

Furniture

Desk

The curriculum calls for classes of 12 students. Each student must be provided with a desk or desk area sufficient in size to permit desk work. Desks may be individual, or conference-type tables can be used to provide work areas for groups of students. If individual desks are used, they must provide sufficient space for writing. Combination desks and chairs are appropriate if they are large enough to accommodate adults.

Chairs

One chair must be provided for each student. Chairs need not be padded or upholstered for additional comfort as students will infrequently spend more than one or two hours in a classroom session.

Storage Areas

Cabinets, closets or other suitable areas for storing student workbooks, handouts, and other instructional materials should be provided. Storage areas for students may be integral to student desks or separate.

They need not be secured, but should provide a place for students to store materials during the class day.

Chalkboards

At least one chalkboard or other suitable surface for instructor notes should be available. It should be at least 4 feet in height and 8 feet in width. Smaller chalkboards limit the amount of information the instructor can illustrate without having to erase. If possible, chalkboard or other device should be portable or a rollaway. This permits the instructor to position the board in the field of view of all students and maneuver the chalkboard to accommodate other instructional materials in the classroom.

Table

At least one table for displaying training models and devices is required. It should be of rollaway type and of sufficient size and height to permit ready viewing of models and instructor demonstrations.

Instructor Platform

An instructor speaking platform or podium is needed. It should be of sufficient size to permit the instructor to array instructional materials as needed and equipped with a light to permit review of notes and/or comments while viewing movies, slides, etc. It need not be portable but instruction will be facilitated if it is of a rollaway type.

Instructional Aids

The term "instructional aids," as used in this manual, refers to two-dimensional materials used for instructional purposes. The Curriculum provides for three types of instructional aids: visual aids, displays, audiovisual aids, and videotape playback.

Visual Aids

The primary visual aids called for in the Curriculum is transparencies. This type of visual aid has the following advantages in teaching materials used in the Curriculum:

Alteration of Aid--With the use of a grease pencil, instructors can highlight areas of drawings, complete forms, draw diagrams, and so on. This facilitates the highly interactive instruction called for in the Curriculum.

Lights-on Instruction--Overhead projections are made to be used with normal classroom lighting. This further facilitates student-instructor interaction by allowing students to see their materials as well as one another.

Local Reproduction--Transparencies can be made inexpensively from hard copy, which is distributed as part of the Curriculum material, rather than as a separate package.

While no slides are provided as part of the Curriculum materials, their use is encouraged, particularly where realistic, photographic visuals are advantageous. Prime candidates for photographic slides are any of the Curriculum transparencies plus (1) traffic scenes, to aid in formulation of defensive driving strategies, (2) potentially hazardous situations, to aid in hazard recognition, (3) vehicle components, to aid in component location and identification, and (4) vehicle defects to aid in vehicle inspection. Commercially available slide packages are identified in the List of Available Training Aids in this Manual.

Displays

The term "displays," used in this Manual, refers to instructional aids that do not require projection and which, therefore, can remain readily visible at all times. While not specifically called for the by Curriculum, the following displays can be used:

Forms--Large plastic-coated blowups of printed forms, upon which information can be entered by means of a grease pencil, or other means, e.g., driver daily logs, bill of lading.

Vehicle Characteristics--Photographic reproductions of vehicle cab interiors, components parts, and auxiliary equipment to aid in locating and identifying components.

Reference Information--Data and other technical information to which students must have frequent recourse throughout instruction, e.g., weight limits, Range rules, summary checklists.

Traffic Boards--Magnetic or flannel surface diagrams of road configurations upon which model vehicles can be mounted to create various traffic situations (while three-dimensional in fact, these displays are only two-dimensional when viewed by students).

A type of display commonly found in classrooms is one containing traffic safety messages, intended to serve as a reminder. Since there is no evidence that this type of aid serves any instructional functions, it is not called for in the Curriculum.

Audiovisual Aids

Audiovisual aids include films, videotapes, and slide/cassette presentations. No specific audiovisual aids are called for in the curriculum because of the expense involved. However, a list of available audiovisual aids is provided in the List of Available Training Aids in this manual.

Audiovisual aids have the following advantages in teaching tractor-trailer operation:

Motion--Films and videotapes have the ability to show motion, a feature that is particularly valuable when the information content itself is highly dynamic. Useful applications include: (1) portraying traffic situations in "real time" so that students can react realistically; (2) showing the dynamic forces that operate on the vehicle and driver, e.g., hydroplaning, centrifugal force in a turn; and (3) presenting procedures for carrying out various activities, including vehicle operation and cargo handling.

Uniformity of Presentation--An audiovisual presentation is given in the same way each time. This assures that all students get the same information and that it is given the same way. If the presentation is of high quality, its use assures a quality presentation every time.

Range of Information--Beyond their ability to portray motion, audiovisual presentations can communicate a range of information efficiently and in a way that an Instructor or static cannot, e.g., on-the-scene reports, first-person presentations, scenarios.

Criteria for Evaluating Aids

As noted, a list of available instructional aids is provided in the manual. The aids are grouped by the Section and Unit of the course to which they apply. Listing of these aids does not represent an endorsement or recommendation of their use. Any school contemplating use of any aid listed should obtain a sample on short-term loan or rental basis and evaluate it for its application to the information being presented. A set of criteria for evaluating materials appears below:

Relevance--Is the subject of the presentation relevant to the objectives of the Curriculum? Are they relevant to the objectives of the particular unit being taught?

Purpose--Is the purpose of the presentation primarily to present information? Or is it primarily to entertain? To frighten? To arouse feelings?

Information--How much of the information in the lesson does the presentation present? How long does it take to present it?

Accuracy--How accurate is the information provided? Is it current or out of date? Does it correct or perpetuate popular misconceptions?

Timeliness--How current are the situations portrayed? Does the visual portion look dated? Will it detract from the credibility of the information?

Effectiveness--How effectively is information presented? Is the presentation coherent or disjointed? Does it review critical points?

Quality--What is the overall quality of the production? Does it look and sound professional--or amateurish? Do any flaws detract from the effectiveness of presentation?

Videotape

The availability of low cost videotaping and playback equipment allows schools to prepare their own audiovisual presentations. The unique virtue of videotape is that it can be used over and over, making it suitable for use in providing individual students feedback on their performance.

During Street instruction, a video camera could be mounted in such a position that the field of view encompasses the scene in front of the tractor-trailer and, if possible, the eye movement mirror mounted on the visor above the driver, the turn signal display on the display console, speedometer and the tachometer. Sound should be recorded to allow any student's commentary to be recorded. Performances that can be monitored include visual search, signalling, speed management, space management, and hazard recognition.

In reviewing the tape, the students will invariably see things that, being absorbed in control of the vehicle, they failed to notice at the time they are driving. A video tape can also be used to provide feedback on vehicle positioning during Range exercises, although there is no great advantage in doing so because of the feedback that students get at the time they are driving.

The one disadvantage to providing videotape feedback is the time it takes to review the tape. Each hour of videotape driving means an hour of review time. The time could be reduced somewhat if Instructors could preview the tape and identify points of major interest, although this adds even more time. It is primarily because of time limitations that videotapes are not more widely used.

Instructional Equipment

In this manual, the term "instructional equipment" refers to off-the- shelf equipment used for training purposes. The following items are required or recommended in administering the Curriculum.

Overhead Projector--To project the transparencies that are provided as a part of the Curriculum.

Slide Projector--To permit projection of locally prepared slides.

Motion Picture Projector--To make use of applicable commercially produced films.

Video Playback--To display commercially prepared videotapes or those generated during instruction. Video playback should employ either a large monitor (e.g., 24-inch diagonal) or video projector in order that it can be viewed by students in a classroom capable of accommodating 12 students.

Training Devices

The term "training devices" is applied to equipment that is designed to serve a specific instructional need. Instructional devices that are called for in the Curriculum, or capable of benefiting instruction under it, include the following:

- Models
- Feedback devices
- Simulators

Models

The term "models" refers to representations of actual equipment modified in some way to be used in training. Models capable of benefiting instruction under the Curriculum include: tractor-trailer models, vehicle component models, vehicle parts, and cutaways.

Tractor-Trailer Models

The small tractor-trailer models are useful in providing instruction dealing with the causes of jackknifing, skid recovery techniques and vehicle backing. Inexpensive models can generally be obtained from toy stores and hobby shops. To be of maximum use in training, models should have the following characteristics:

Articulation--All of the uses of the tractor-trailers just mentioned require free articulation of the tractor and trailer.

Steerable Front Wheels--To provide the most effective instruction in backing, the front wheels should be capable of rotation about the vertical axis, either through a steering wheel, or by simply rotating the wheels directly.

Lockable Wheels--To provided instruction in skid control recovery, each set of wheels should be capable of being locked in position. This is best accomplished by drilling a hole through the wheel assembly into the trailer body in which a small pin can be inserted to keep the wheels from turning. That way, the pin can easily be inserted and removed as needed. Taping the upper part of the wheel to the vehicle body is acceptable, though more cumbersome.

Vehicle System Models

Instruction in Unit 4.1, Vehicle Systems can be benefited by providing working models of various vehicle systems, including diesel engines, transmission and power train, air brake systems, and cooling systems. Models capable of operation through either electrical or manual (crank) power are frequently available from hobby shops. They do not have to correspond exactly to the vehicles and components employed by the school so long as they demonstrate the important principles of operation. Some sources of models are provided in the List of Available Instructional Material provided in the "Training Aids and List of Sources" in this manual.

Vehicle Components

Various components of the vehicle can be brought in the classroom in order to demonstrate:

Appearance--At a minimum, components can be used to show students what they look like and as an aid to component identification in instruction concerned with vehicle inspection and servicing.

Operation--Some components can be manipulated mechanically to show how they work, e.g., brake shoes and drums.

Defects--Parts that have failed can be brought into the classroom to illustrate failure symptoms as an aid to instruction in vehicle inspection and component trouble-shooting.

No specific set of components is called for. Almost any available component can be profitably used to aid instruction.

Cutaways

This term applies to a vehicle component that has been cut open to expose internal parts. Cutaways are used most often to illustrate the internal parts of engines and transmissions. Cutaways for some components are commercially produced, either by manufacturers of the components themselves or by organizations specializing in training devices. They are typically rather expensive.

Cutaways have been constructed from old, unservicable components with the aid of an acetylene torch. They have also been constructed out of wood fiber and other construction materials that are easy to work with than steel.

Many cutaways have been designed to permit the movement of internal parts, thus permitting their use in demonstrating component operation. Where parts are not operable, the cutaway can still be used to show the physical arrangement of parts.

Feedback Devices

A number of devices have been designed to furnish students and instructors feedback on various aspects of student performance not available through the instruments with which a tractor or trailer are normally equipped. These feedback devices include: tachographs, accelerometers, fuel flow meters, and brake detonators.

Tachographs

A tachograph is a device that provides a printed record of selected characteristics of vehicle operation. Most commercially available tachographs record engine speed (rpm), road speed (mph), distance and time. Some use a very large scale printout to display the driver's response over relatively short periods of time (minutes, hours) while others use a very small scale and display information for an entire trip. The first type would be most suitable for training, and would allow instructors to examine the coordination of road and engine speed in shifting.

The Curriculum does not specifically call for use of tachographs as aids to training because of the ability of instructors to provide immediate feedback by monitoring instruments in the vehicle (installation of an instructor tachometer was described in the earlier description of Vehicle Equipment). Review of tachograph records also takes time. For these reasons, tachographs are not widely used in tractor-trailer training. However, the ability of tachograph records to detect aspects of the driver's control coordination that are not readily apparent during operation, and to review them with students when attention does not have to be shared with control of the vehicle, is advantageous where schools can afford the equipment and the time required.

Accelerometers

Devices designed to measure vehicle accelerations have been widely recommended as an aid in teaching vehicle control. Longitudinal (fore-and-aft) accelerations register the smoothness of the driver's acceleration, shifting, and braking techniques. Lateral (side-to-side) acceleration measure the driver's ability to adjust speed to rate of turn in curves and intersections. Some accelerometers are designed to give visual readouts, while others give an audible signal whenever acceleration exceeds some predetermined value.

Accelerometers are not inexpensive, particularly those that are rigged up to signal overacceleration. They also require frequent adjustment and must be level within the vehicle to give proper outputs. Finally, those that give audible signals are frequently setoff by bumps in the road.

Despite the claims that have been made for the value of accelerometers, there is no well-controlled study of their value over the "seat-of-the-pants" indications of overacceleration readily available to the instructor and student. No recommendation either for or against the use of accelerometers in conducting training under this Curriculum can be made.

Fuel Efficiency Displays

Two types of displays have been used to provide feedback to drivers on fuel efficiency of vehicle operation:

Vacuum Gauges--Devices that measure engine vacuum, indicating the efficiency with which the engine is operating.

Fuel Meters--Devices that measure the rate of fuel consumption, both at the moment and over time. Combined with the odometer, they also give both instantaneous and cummulative readings of mpg.

Of the two types of devices, fuel meters are the most beneficial in teaching fuel efficiency of tractor-trailer operation. Vacuum gauges are intended primarily for use in gasoline powered automobiles and measure only fuel efficiency of acceleration.

Fuel meters can readily demonstrate to students the effect of almost any aspect of driving capable of influencing mpg such as

- o shifting at various road and engine speeds
- o maintaining momentum by anticipating and adjusting to traffic lights and traffic ahead
- o idling the engine unnecessarily
- o avoiding operation at high speeds (e.g., over 55 mph)

Fuel meters can promote energy efficient operation in two ways. First, by showing the effect of various aspects of driving upon fuel efficiency, they can enable drivers to learn what are the most fuel efficient responses, e.g., the optimum engine rpm for shifting. Secondly, by showing the magnitude of fuel savings that can be obtained, they can motivate drivers to operate fuel efficiently, e.g., not idling the engine at truck stops.

Brake Detonator

A demonstration of the effect of speed upon stopping distance is called for during the Range lesson of Unit 2.3, Speed Management. The demonstration requires the use of a "brake detonator," that is, a device that uses chalk and an explosive charge to leave a mark upon the pavement when activated. Two- and three-barrel detonators are available.

With the two-barrel detonator, one charge is fired by the instructor at the moment a "stop" signal is given and the other is fired by the brake pedal at the moment the brake is applied. With the three-barrel detonator, a third charge is automatically fired by a mercury switch when the vehicle starts to decelerate. The distance between the marks left by first and second charges demonstrate the driver's reaction, while the distance between the second and third demonstrates the vehicle's air brake system "lag time."

Instruction under the Curriculum requires the use of a 3-barrel detonator. However, if not available a pair of 2-barrel detonators may be used.

Simulators

The most elaborate and costly category of instructional devices consists of simulators. In training, the term "simulator" refers to a device that simulates one or more of the tasks that the student will have to perform. They are not intended to simulate equipment, such as tractor- trailers, and therefore do not necessarily have to have any physical resemblance to equipment. The simulators that have been most widely recommended for use in training tractor-trailer drivers are

- o highway-traffic simulators
- o remote control simulators
- o gearshift simulators
- o blowout simulators

Highway-Traffic Simulators

The type of simulator most widely used in training drivers is that which simulates the highway-traffic and environment in order to provide drivers instruction and practice in reacting to roadway configurations and the actions of other road users. By far the most frequently used type of highway-traffic simulator is that which uses motion picture film to display the highway-traffic environment. Drivers respond to various aspects of the environment through steering, accelerating, braking, and signaling responses. Almost all of the simulation used in driver education is of this type.

Highway traffic simulation has the following advantages:

- Ability to display situations that would take a long time to encounter in actual operation.
- Ability to expose drivers to situations that would be too hazardous to create in actual driving.
- Ability to record responses, in order to permit individual feedback in classes involving numbers of students.

The limitation of this type of simulator is that it cannot be used to teach control of the vehicle. While the driver responds to the highway traffic situation, the situation does not respond to the driver, as would be the case in normal driving. No matter what the student does, the highway traffic scene continues to be that recorded on film. Therefore, students get no feedback on the effect that their steering, acceleration and braking responses have upon the vehicle. Motion picture simulators are used largely to teach safe operation practices.

The popularity of motion picture simulators in driver education is due primarily to laws and regulations in many states that require BTW time to be offset by use of simulation. Since there are no laws regulating the amount of BTW time required in teaching tractor-trailer drivers, this advantage is absent.

Many believe that the primary value of motion picture simulators lies in the films rather than the expensive hardware used to monitor and record student responses. In any case, in view of the limited number of tasks that can be taught through the use of motion picture simulators, and the lack of data substantiating their value in developing necessary knowledges and skills, the use of simulators as a substitute for operation of the tractor- trailer in training cannot be recommended. Nor can "simulator time" be used to reduce any of the lesson times required herein.

There are available other highway-traffic simulators in which the display representing the environment responds realistically to the student's operation of the vehicle. However, the ability of these simulators to portray highway-traffic environment is very limited and obtaining a realistic vehicle response tends to be quite expensive. Moreover, they can tend to create motion sickness due to the fact that the eyes perceive motion while the body does not. Recent advances in the technology of simulators,

permitting motion picture images to respond somewhat to driver control responses may improve the usefulness of highway- traffic-simulators in teaching vehicle operation.

Remote Control Simulators

One of the earliest forms of vehicle simulation is that in which operators control the motion of the vehicle remotely through radio signals. Radio control tractor-trailers have been used for training purposes.

This type of simulator does not really simulate driving tasks, since the driver is observing the vehicle rather than the driving scene. For that reason, this "outside-in" type of simulation is used primarily to teach principles of motion rather than vehicle operation. Since principles can be taught just as easily by moving model vehicles manually, the radio control feature has little advantage. This type of simulation is not recommended for use with the Curriculum.

Gearshift Simulators

Wear and tear put on transmissions by students during the early stages of instruction in shifting has motivated the use of simulators to provide students early practice in shifting techniques.

Gearshift simulators consist of shift levers on which students manipulate and a tachometer or speedometer (or both) providing feedback on the effects of shifting. On the most sophisticated gearshift simulators, an an analogue or digital computer translates the students manipulation of the shift lever into appropriate rpm and mph readings. Simpler devices are purely mechanical, consisting of an actual transmission powered by an electric motor.

The advantages of computerized simulation include the ability to simulate (1) the effect of loads upon the drivetrain (e.g., cargo), (2) engine "lugging" when the rpms fall too low, and (3) different types of transmission systems. The primary advantage of mechanical simulators is their lower cost, particularly when they are constructed by school personnel from old, unservicable transmissions.

Whether or not gearshift simulators represent a cost-effective way of teaching shifting is a subject of considerable disagreement among school administrators. Those who have them tend to use them. Those who do not have them generally see them as having limited usefulness, either because they believe that it does not provide realistic practice or because they feel they can avoid wear and tear on transmissions through good instruction.

No systematic evaluation of the cost-effectiveness of gearshift simulators in developing shifting skills has been performed. It is doubtful that very expensive devices can pull their weight, particularly where large numbers of students must receive training at the same time. However, the availability of a mechanical simulator to provide remedial instruction would allow students who were having difficulties to overcome them without tying up a training vehicle or tearing up its transmission.

Blowout Simulator

A blowout simulator does not so much simulate a blowout as it does to create one. It consists of a modified wheel rim that allows the Instructor to exhaust air from the tire rapidly by activating a device inside the cab. The tire then can be quickly reinflated from a air tank carried on the vehicle. In a tractor-trailer driver training program, the rim would be placed on one of the front wheels since it primarily front wheel blowouts that are of concern.

The effectiveness of training with the blowout simulator has not yet been determined. Cost-effectiveness is not a consideration since there is no other way to provide such training. Since the response to a front wheel blowout is not in itself complicated--holding the wheel firmly and staying off the brake--the primary value of a simulator is in permitting students to experience a blowout in order to (1) impress upon them the need for maintaining a firm grip on the wheel at all time, and (2) giving them confidence in their ability to maintain control over the vehicle. Bearing the expense of a simulator to attain this limited objective is therefore not required.

TRAINING AIDS AND LIST OF SOURCES

The following is a list of instructional aids that are available for use in conjunction with this course. Items are listed according to their applicability to the entire course, sections of the course or individual units. Note: These items have not been reviewed, hence no endorsement is made or implied of their suitability or accuracy.

Following the list of aids, are the addresses of the organizations from which these and possibly other items can be obtained.

Entire Course

Anatomy of a Safe Trip. National Safety Council, booklet, 20 pages

ATA Fleet Safety Service, American Trucking Associations, an annual subscription service containing standards, materials, loss prevention (safety) training material, reference manual

Carrier or Killer, Greater Los Angeles Chapter - National Safety Council, a 16mm film covering six main causes of truck accidents (weather, alcohol, pills, fatigue, speed, carelessness), 28 minutes

Company Roadeo Manual, American Trucking Associations, how to conduct a company truck roadeo and use of roadeo as a testing, training and recognition device, 17 pages

Driver Education Equipment Catalogue, American Automobile Association, a listing of items including many types of driver testing equipment, brake detonators (Unit 2.3), eye movement (check) mirrors (Unit 2.1), plus other classroom and driving range training aids, 33 pages

Driver Education Supplies Catalogue, Bumpa-Tel, a listing of films, projection equipment, classroom and range training aids and driver evaluation equipment, such as brake detonators and student eye check mirrors, 40 pages

Driver Trainer Manual, Private Truck Council of America, includes chapters on the driver trainer, effective teaching methods, safe driving rules and regulations, 63 pages

Driving Safety: Trucks, Library Filmstrip Center, filmstrip, color/sound, 60 frames, 17 minutes

Facts for Drivers, American Trucking Associations, in question/answer format covering safe drving, the FMCSR, fire-fighting and first aid, a pocket size booklet for training drivers

Federal Motor Carrier Safety Regulations (pocket size), American Trucking Associations, covers Parts 390-397 of the FMCSR and a digest of the Hazardous Materials Regulations

Entire Course (continued)

Federal Motor Carrier Safety Regulations Interpretations, Bureau of Motor Carrier Safety, booklet containing official interpretations of the FMCSR, August 1983 edition, 23 pages

Federal Motor Carrier Safety Regulations Pocketbook, J.J. Keller and Associates, Parts 390-397 of the FMCSR and a Compendium of the Hazardous Materials Regulations and Explanations

Federal Motor Carrier Safety Regulations Training Package, #A00800, National Audiovisual Center, 514 color slides, 8 cassettes and script

Film Rental Catalogue, Greater Los Angeles Chapter - National Safety Council, a listing of 1,500 films and video cassettes covering subjects in safety, health, training, supervision, traffic, first aid and commercial vehicle transportation, 60 pages

Fleet Safety Compliance Manual, J.J. Keller and Associates, a reference manual

Fleet Safety Training Aids Source Directory, J.J. Keller and Associates, listing of films, tapes, books, etc., for driver training, 59 pages

Motor Vehicle Driving Practices, J.W. Lord Publishing Company, contains a broad range of material on defensive driving practices, the driver's responsibility and foul weather driving practices, 64 pages

Pro-driving Attitudes, The Film Library, film, color, 13 minutes

Professional Truck Driver's Handbook, Private Truck Council of America, A digest of the Federal Motor Carrier Safety Regulations that drivers must know, illustrated, pocket size, 70 pages

Safety--A Way of Life, National Safety Council, film, color, 21 minutes

Safety and Training Film Catalog, International Safety Academy, 34 pages

Safety Equipment Catalogue, Direct Safety Equipment Company, a listing of items to support many areas such as driving range pavement markers (striping machines), traffic cones, barricades and personal protective equipment, 68 pages

Safety Management Products, Catalog, International Safety Academy (Texas), 9 pages

The Driver Safety and Education Training System , Transportation Industry Consultants, Inc., covers several areas, 125 pages

Entire Course (continued)

The Interstate Truck Drivers Handbook, J.J. Keller and Associates, Simplified Version of Driver's Responsibilities as required by the Federal Motor Carrier Safety Regulations, 80 pages

The Safety Makers, International Safety Academy, catalog of rental safety and training films, 24 pages

Truck Driver Training Manual, American Trucking Associations, a supervisor's guide for training fleet drivers, 85 pages

Truck Drivers Handbook, American Trucking Associations, covers such areas as driving rules, accident procedures, equipment care, public relations and courtesy, a pocket size booklet

3-D Driving Course, The Hartford Insurance Company, an advanced course in traffic safety for commercial fleet drivers

Section 1

ATA Truck Roadeo Course Diagrams and Problems, American Trucking Associations, this booklet is revised periodically and is essential to setting up realistic driving range problems for this training curriculum.

ATA Truck Roadeo Rules and Procedures - State and National, American Trucking Associations, revised annually, 106 pages

Stopping-Parking-Emergency Warning Devices, Transportation Industry Consultants, Inc., sound on slide.

Unit 1.1

The Professional Way: Defensive Driving, National Safety Council (Stock Number 298.60) covers the six point professional driving code in a 27 page pocket size booklet - although defensive driving is not taught in this unit it is useful for introduction to what professional driving is all about

Unit 1.3

Driver Inspection Report, American Trucking Associations, driver's daily vehicle inspection report forms in triplicate

Driver Pre-trip Inspection, Transportation Industry Consultants, Inc., sound on slide

Take the Trouble, Greater Chicago Safety Council, film, 16 mm, color, 13 minutes

Unit 1.3 (continued)

Take the Trouble, Greater Los Angeles Chapter - National Safety Council, 16 mm film on pretrip vehicle inspection, 13 minutes

Vehicle Inspection Report Form, J.J. Keller Associates, driver's daily vehicle inspection form, with step-by-step instructions on what to inspect

Unit 1.6

Better Backing, National Safety Council, 30 slides and script

Big Blind Spot (preventing backing accidents), National Safety Council, film 16 mm, color, 10 minutes

Let's Stop Here (parking), Greater Chicago Safety Council, film, 16 mm, color, 10 minutes

Look, Stop Backing Accidents, National Safety Council, booklet, 18 pages

Look, Stop Backing Accidents, National Safety Council, film 16 mm, B&W, 10 minutes

Unit 1.7

Hooking Up the Twin Trailer, National Safety Council, film, color, 11 minutes

Uncoupling the Twin Trailer, National Safety Council, film, 16 mm, color, 11 minutes

Unit 1.9

Hooking Up the Twin Trailer, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 11 minutes

Uncoupling the Twin Trailer, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 11 minutes

Section 2

A Matter of Adjustment, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 10 minutes

Adapting to Conditions, The Film Library, film, color, 8 minutes

Always the Other Guy, American Trucking Associations, film, 16 mm sound, 20 minutes

City Driving, Transportation Industry Consultants, Inc., sound on slide

Section 2 (continued)

Deadly Driving Errors Series, "A Matter of Adjustment", National Safety Council, film, 16 mm, color or B&W, 10 minutes

Defensive Action, Indiana University Audio-visual Center, (defensive driving), film, 16 mm, B&W, 30 minutes

Defensive Driving--Managing Time and Space, American Automobile Association, leaflet (also under Section 3)

Driving the Interstates: Seven Skills for Safety, Greater Chicago Safety Council, Inc., film, 16 mm, 23 minutes

Emergencies In the Making, National Safety Council, (avoiding hazardous situations), film, 16 mm, color, 15 minutes

Evaluating Expressway Dynamics, Aetna, filmstrip and audiotape

Facts for Drivers, American Trucking Associations, booklet, 133 pages (also under Section 3 and Unit 5.4)

Freeway Driving is Different, American Automobile Association, film, 16 mm, color, 15 minutes

Freeway Driving Tactics, The Film Library, film, 16 mm, color, 16 minutes

I.P.D.E. Response Driving Course, Aetna, A complete course for defensive driving with student and instructor manuals

Intersections, Transportation Industry Consultants, Inc., sound on slide

Interstate Driving, Transportation Industry Consultants, Inc., sound on slide

Living with the Smith System, Greater Los Angeles Chapter - National Safety Council, 16 mm film or video cassette, 12 minutes

Passing, Being Passed and Meeting Other Vehicles, Transportation Industry Consultants, Inc., sound on slide

Personality and Perception, Aetna, (affects of personality on perception) filmstrip and cassette, color

Preventable - Yes or No?, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 10 minutes

Question of Alternatives, North American Van Lines, 16 mm film or video tape program, color, 12 minutes

Rail-Highway Grade Crossings, Transportation Industry Consultants, Inc., sound on slide

Section 2 (continued)

Signs of the Times, Greater Los Angeles Chapter - National Safety Council, 16 mm film, explaining meaning, placement and importance to safe driving of highway signs, 7 minutes

Speed, Stopping and Following Distances, Transportation Industry Consultants, Inc., sound on slide

Split Second Decisions, National Safety Council, (avoiding emergency situations), film, color, 14 minutes

Spot the Driving Errors, National Safety Council, film, color, 13 minutes

The ABC's of Defensive Driving, Indiana University Audio-visual Center, film, 16 mm, 13 minutes

The Expert Seeing Series, National Safety Council, 5 different films

1. Aim High in Steering, 2. Get the Big Picture, 3. Keep Your Eyes Moving, 4. Leave Yourself an Out, 5. Make Sure They See You, All 16 mm color films, each one approximately 10 minutes long

The Final Factor, National Safety Council, (how different factors contribute to an accident), film, 16 mm, 14 minutes

The Iron Graveyard, Greater Los Angeles Chapter - National Safety Council, a 16 mm film on city driving, 10 minutes

The Magic Circles of Defensive Driving, National Safety Council, film, 16 mm, color, 10 minutes

The Magic Circles of Defensive Driving, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 10 minutes

The Road Test 9 in 10 Drivers Can't Pass (Avoiding driving errors), Institute of Driving Behavior, booklet, 24 pages

Unit 2.1

Big Blind Spot, Greater Los Angeles Chapter - National Safety Council, 16 mm film or video cassette, 10 minutes

Look Ahead, Transportation Industry Consultants, Inc., sound on slide

Seeing Habits for Expert Driving, Ford Motor Company Film Library, filmstrip, record, and work book

Test Your See Power, National Safety Council, booklet

The Smith System of Space Cushion Driving (Commercial Vehicles), Greater Los Angeles Chapter - National Safety Council, 16 mm film or video cassette, 30 minutes

Training Your Eyes for Expert Driving, Institute of Driver Behavior, booklet, 14 pgs

Unit 2.1 (continued)

Visual Acuity Tester with Color Recognition, American Automobile Association, equipment

Unit 2.3

A Matter of Distance, Greater Los Angeles Chapter - National Safety Council, a 16 mm film demonstrating "Timed Interval Driving Technique", 10 minutes

A Matter of Speed, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 10 minutes

Can You Stop in Time?, Greater Chicago Safety Council, film 16 mm, color, 10 minutes

Deadly Driving Errors Series, "A Matter of Speed", National Safety Council, film 16 mm, color, or B&W, 10 minutes

Pro Driving Tactics, Greater Los Angeles Chapter - National Safety Council, 16 mm film or video cassette, 15 minutes

Reaction Brakes and You, National Safety Council, film 16 mm, color, 8 minutes

Speed Management, North American Van Lines, 16 mm film or video tape program, color 10 minutes

Strategy and Tactics of Safe Driving, Intext, manual and transparencies

Tire Hydroplaning, New York State College Film Library, film, 16 mm, B&W, sound, 12 minutes

Too Fast for Conditions, American Trucking Associations, film, 16 mm, color, 13 minutes

Unit 2.4

A Matter of Intersections, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 10 minutes

A Matter of Passing, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 10 minutes

Compromise and Separate, Aetna, filmstrip and audiotape

Deadly Driving Errors Series, "A Matter of Distance;" "A Matter of Intersections;" "A Matter of Passing", National Safety Council, film, 16 mm, color, 10 minutes each

How to Pass Safely, National Safety Council, film 16 mm, B&W, 10 minutes

Intersection Safety, Greater Chicago Safety Council, film, 16 mm, color, 10 minutes

Unit 2.4 (continued)

Isolate and Stabilize, Aetna, filmstrip and audiotape

Space Management, North American Van Lines, 16 mm film or video tape program, color, 10 minutes

The Crossroads Crash, National Safety Council, film, 16 mm, B&W, 10 minutes

Unit 2.5

A Matter of Darkness, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 10 minutes

Deadly Driving Errors, Series II, "A Matter of Darkness", National Safety Council , film, 16 mm, color, sound, 10 minutes

Driver in the Dark, National Safety Council, booklet

Driving at Night, National Safety Council, film, 16 mm, color, 10 minutes

Driving Under Special Conditions, National Safety Council, film, 16 mm, B&W, 25 minutes (also under Unit 2.6)

Night Driving Tactics, Auto Club of Southern California, film, 16 mm, color, 17 minutes

Night Driving Tactics, The Film Library, film, 16 mm, color, 20 minutes

Night Operations, North American Van Lines, 16 mm film or video tape program, color, 10 minutes

Night Sight Meter, American Automobile Association, (measures vision in darkness), equipment

Porto Glare, Intext, (portable night driving simulator), equipment

To Drive at Night, American Automobile Association, film, color, 13 minutes

Unit 2.6

Adverse Weather, Transportation Industry Consultants, Inc., sound on slide

Adverse Weather Driving, National Safety Council, slides and discussion questions, 10 minutes

Driving Under Special Conditions, National Safety Council, film, 16 mm, B&W, 25 minutes (also under Unit 2.5)

Unit 2.6 (continued)

Extreme Driving Conditions, North American Van Lines, 16 mm film or video tape program, color, 10 minutes

Keep Rolling with Safety in Winter Weather, National Safety Council, booklet, 16 pgs

Safe Driving in Bad Weather--Trucks, National Safety Council, film, 16 mm B&W, 16 minutes

Surviving Winter Driving, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 10 minutes

The ABC's of Safe Winter Driving, Channing L. Bete Company, booklet

Winter Truck Driving, National Safety Council, film, 16 mm, color, 19 minutes

Winter Truck Driving Safety, National Safety Council (Stock Number 399.54), a 14 page booklet of training information based upon tests conducted annually by the Committee on Winter Driving Hazards

Section 3

Emergency Driving Tactics, Greater Los Angeles Chapter - National Safety Council, 16 mm film or video cassette on many common emergency driving situations, 18 minutes

Facts for Drivers, American Trucking Associations, booklet, 133 pgs (also under Section 2 and Unit 5.4)

Panic Preventer, National Safety Council, (discussion of highway emergencies), booklet

Safety On the Move: Truck Haulage Safety, Greater Los Angeles Chapter - National Safety Council, 16 mm film, 16 minutes

Skids Can Be Controlled, Liberty Mutual, film, 16 mm, color, 15 minutes

Spot the Driving Errors, Greater Los Angeles Chapter - National Safety Council, covers 30 driving errors using commercial vehicles, a 16 mm film with an answer checklist included, 15 minutes

The Professional Way: Defensive Driving, National Safety Council, (Stock Number 298.60) covers the six point professional driving code in a 27 page pocket size booklet

Unit 3.1

Hazard Perception, North American Van Lines, 16 mm film or video tape program, color, 12 minutes

Identify and Predict, Aetna, filmstrip and audio tape

Unit 3.1 (continued)

Impediments to Vision and Control, Aetna, filmstrip and audio tape

Perception of Driving Hazards, Shell Oil Co., film, 35 mm, color filmstrip and guide book

Putting it All Together (IPDE), California Traffic Safety Foundation, film

See-Think-Do, National Safety Council, 30 slides, color, script

Unit 3.2

A Split Second from Danger, Aetna, (dealing with imminent collisions), film and discussion guide; driver improvement services.

Brake Detonator, American Automobile Association, equipment

Defensive Driving-Managing Time and Space, American Automobile Association, (covers evasive tactics), leaflet

Emergency Driving Tactics, Greater Chicago Safety Council, film, 16 mm, color, 18 minutes

Emergency Maneuvers, Ford Motor Company Film Library, filmstrip/records

Reacting to Emergencies, Aetna, filmstrip

Unit 3.3

Six Deadly Skids, National Safety Council, film, 16 mm, color, 26 minutes

Skid Control and Recovery, North American Van Lines, 16 mm, film or video tape program, color, 13 minutes

Surviving Winter Driving, Greater Los Angeles Chapter - National Safety Council, 16 mm film or video cassette, 10 minutes

Section 4

ABC's of the Diesel Engine, General Motors Corp., film, 15 minutes

Air Brake System-Part 1, Bendix, 35 mm slides, cassette, meeting guide, handout material

Air Brake System-Part 2, Bendix, 35 mm slides, cassette, meeting guide, handout material

Air Brake System Maintenance, Bendix, 35 mm slides, cassette, meeting guide, handout material

Vehicle Maintenance Records, J.J. Keller and Associates, many different types of records and forms

Section 4 (continued)

In addition to the above materials for Section 4, catalogs of instructional aids can be obtained from the following companies:

Audio-Visual programs on ignition systems, Standard Motor Products

Bulletin 79-3387109; Service Training Aids Publications Parts Catalogs, Cummins Engine Co.

Clark 5 Speed Manually Shifted Transmissions, Clark Equipment Co., 35 mm slides and script

Fuel Injection Pump Wall Charts, American Bosch

Information Regarding Electrical Systems, The Prestolite Co.

Slide/Cassette Programs and Cutaway Turbocharger Displays, Roto-Master

The Care and Feeding of Diesel Engines, CAV Simms Bryce, booklet

The Long Haul (oil filters); Go Heavy Duty (oil filters), AC Spark Plugs, super 8 mm films, 15 minutes each

Theory of Operation of Axle Differentials, Clark Equipment Co., 35 mm slides, script and 2 cassettes.

Wall Charts and Other Information on Vehicle Systems, Mack Trucks, Inc.

All tractor manufacturers have service manuals and shop manuals which contain excellent information and illustrations. Contact the manufacturer or local dealer for information on how to order.

Section 5

A Truck Driver's Concern, Transportation Industry Consultants, Inc., sound on slide

Safety Attitudes, Industrial Training Aids, film, color, 10 minutes

The Professional Driver, Transportation Industry Consultants, Inc., sound on slide

Unit 5.1

A New Way to Lift, National Safety Council, film color, 10 minutes

Be a Pro, Hyster Co., (forklift operation), film, 16 mm, color, 17 minutes

Bend Your Knees, International Loss Control Institute, film, 16 mm, color, 22 minutes

Unit 5.1 (continued)

Delivery Injuries, The Film Library, film, color, 7 minutes

Don't Drop the Ball, The Film Library, (forklift operation), film 16 mm, color, 18 minutes

Driver's Pocket Guide to Hazardous Materials, J.J. Keller and Associates, A simplified version of the D.O.T. Hazardous Materials Regulations, including colored placard charts, 267 pages

Handbook of Rigging - Third Edition - by W.E. Rossnagel, McGraw-Hill Publishing, An in-depth text covering rope, chain, cables, wire ropes, slings, blocking, bracing and useful formulas, 383 pages

Handle With Care, Eaton Corp., (forklift operation), film, 16 mm, color, 16 minutes

High Pressure Cylinders, International Training Consultants, (safe handling), 35 mm filmstrip, with cassette

How to Avoid Muscle Strains, National Safety Council, film, 16 mm, color, 15 minutes

Injury Control, American Trucking Associations, 7 different slide cassette programs explaining safe work practices

Lifting, Man's Age Old Problem, National Safety Council, film, color, 14 minutes

Manual Lifting, International Training Consultants, 35 mm filmstrip and cassette

Rythm ("Remember How You Treat Hazardous Materials"), Du Pont, program, seminars, slides, cassettes, films, filmstrips, cards, posters, decals

Safe Operation of Industrial Trucks, National Fire Protection Association, wall chart

Techniques of Lifting, National Safety Council, film, color, 10 minutes

The Big Lift, Hyster Co., (forklift operation), film, color, 15 minutes

The Color of Danger, National Safety Council, (forklift operation), film, color, 25 minutes

The Industrial Weight Lifter, National Safety Council, (avoiding back injuries), film, 16 mm, color, 15 minutes

The Split Second, Industrial Training Aids, (preventing industrial accidents), film, color, 11 minutes

Transportation Emergency Guides, Manufacturing Chemists Association, (information cards with accidents involving chemicals)

Unit 5.1 (continued)

NOTE: Many of these items on safe lifting are also applicable to Unit 5.5

Unit 5.2

Handling Hazardous Materials, American Trucking Associations, covers all aspects of handling hazardous materials, duties of transport personnel and illustrates placards and labels with instructions for their use

Hazardous Materials Slide Program, American Trucking Associations, a 5 part audio-visual presentation for training drivers

Hazardous Materials Supplies, American Trucking Associations or J.J. Keller and Associates, can supply vehicle placards, shipping labels, cargo manifests and wall chart-loading and storage guides

Motor Carrier Employees Handbook for the Prevention of Freight Loss and Damages, American Trucking Associations, training material for transportation personnel who handle freight or freight documents to prevent damages, loss or delays

Transportating Hazardous Waste, American Trucking Associations, covers E.P.A. and D.O.T. as well as State requirements for hazardous waste transportation including the cargo manifest, registration and permit requirements

Unit 5.3

Driver's Duty Status Record Supplies, American Trucking Associations, or J.J. Keller and Associates can supply Driver's Daily Status Record Books (formerly called log books), multi-day logs, monthly log summary sheets and log summary envelopes

Driver's Log, Transportation Industry Consultants, Inc., sound on slide

Supervisors Guide to Hours of Service, J.J. Keller and Associates, a comprehensive training booklet of 49 pages, covering both Federal and State drivers hours of service regulations. Provides examples, charts and covers use of the various type logs as required by the Driver's Duty Status Record

Unit 5.4

A Life at Stake - CPR, Greater Los Angeles Chapter - National Safety Council, 16 mm film or video cassette on Cardiopulmonary Resuscitation, 21 minutes

Be Your Own Traffic Judge, National Safety Council, (evaluating accidents), booklet, film, slides

Unit 5.4 (continued)

Bleeding--What to Do, The Film Library, film, 16 mm, color, 17 minutes

Breath of Life, National Safety Council, (mouth to mouth resuscitation), film, 16 mm, color, 20 minutes

Cardiopulmonary Resuscitation (CPR), US Department of the Interior, film, color, 19 minutes

Emergency First Aid, Film Communicators, film, 16 mm, color/sound, 19 minutes; slides, color, 35 mm, 19 minutes; filmstrip, 35 mm, 19 minutes

Extinguish That Fire, The Film Library, film, 16 mm, color, 25 minutes

Facts for Drivers, American Trucking Associations, 133 pgs (also under Section 2 and Section 3)

Fire Prevention and Fire Fighting, Transportation Industry Consultants, Inc., sound on slide

First Aid Action, The Film Library, film, 16 mm, color, 22 minutes

First Aid Now, National Safety Council, film, 16 mm, color, 26 minutes

First On the Scene, Greater Los Angeles Chapter - National Safety Council, a 16 mm film detailing steps to take at the scene of an accident, 16 minutes

Flammable Liquid Fire Safety, The Film Library, film, color, 20 minutes

In Case of Accident, National Safety Council, film, B&W, 10 minutes

Incident Rendered Safe, Greater Los Angeles Chapter - National Safety Council, a 16 mm film dealing with 2 road accidents involving hazardous chemical loads, 22 minutes

Incident Rendered Safe, The Film Library, (hazardous cargo accidents), film, color, 20 minutes

Portable Fire Extinguishers, The Film Library, film, 16 mm, color, 20 minutes

Preventable--Yes or No, The Film Library, film, color, 10 minutes

Red Cross Multimedia Course in First Aid, See local chapters of American Red Cross

Report That Accident, National Safety Council, film, 16 mm, color, 10 minutes

Unit 5.4 (continued)

Standard First Aid Film Series, National Safety Council, 10 films

1. The Why and How of Standard First Aid
2. First Aid Artificial Respiration
3. First Aid Bandaging
4. First Aid for Burns
5. First Aid for Common Emergencies
6. First Aid for Injuries to Bones, Joints and Muscles
7. First Aid for Poisoning
8. First Aid for Shock
9. First Aid Transportation of the Sick and Injured
10. First Aid for Wounds

Each film is in 16 mm, B & W, 25 minutes long

The Chemistry of a Petroleum Fire, The Film Library, film, 16 mm, color, 28 minutes

Using Fire Extinguishers, National Fire Protection Association, film, 16 mm, color, 13 minutes

Unit 5.5

A Question of Attitude, Greater Los Angeles Chapter - National Safety Council, 16 mm film dealing with the role of emotions and personal problems in accidents, film, color, 10 minutes

Alcohol, Tobacco and Drugs Versus Physical Fitness, Greater Los Angeles Chapter - National Safety Council, 16 mm film or video cassette, 23 minutes

Driver Attitudes, Greater Los Angeles Chapter - National Safety Council, 16 mm film or video cassette covering drinking and driving and attitudes/emotions with some stop-action multiple choice questions (question sheet included), 15 minutes

Drugs, Drinking and Driving, AIMS Instruction Media Series, Inc., film, 16 mm, color, sound, 20 minutes

Fatigue Can Be Fatal, National Safety Council, 8 pages

Fit to Drive. The Film Library, (physical fitness and medication), film, color, 10 minutes

Liquor, Narcotics and You, Transportation Industry Consultants, Inc., sound on slide

Unit 5.5 (continued)

Marijuana, Driving and You, Greater Los Angeles Chapter - National Safety Council, 16 mm film on effects of marijuana on driving abilities, 13 minutes

Moods in Safety, Industrial Training Aids, film, color, 21 minutes

Safety Belts--Fact or Fiction, National Audio Visual Center, 50 35 mm slides, sound tape and script, 12 minutes

Safety Through Seat Belts, Industrial Training Aids, film, B&W, 12 minutes

The Driving Edge, Greater Los Angeles Chapter - National Safety Council, (physical fitness and driving), 16 mm film, 10 minutes

Truck Drivers Only, Greater Los Angeles Chapter - National Safety Council, 16 mm film, color, showing professional driver's need for good on-the-road living habits, 14 minutes

UFO/Unrestrained Flying Objects, (safety belts), General Motors, Corporation, California Traffic Safety Foundation, film, 16 mm, color, 14 minutes

Where Have All the People Gone? (safety belts), California Traffic Safety Foundation, film, 16 mm, color, 14 minutes

NOTE: Many of the items listed in Unit 5.1 Re: Lifting may be used here

Unit 5.6

Bulletin Advisory Service, State Laws Department of American Trucking Associations (same address as Safety and Security Department) order number SL 1011, gives complete State requirements concerning taxes, sizes and weights, special permits, registration, operating authority, vehicle requirements, and summary tables and charts, available by annual subscription

Federal Regulations for Private Truck Operators, Private Truck Council of America, interprets the laws in easy to understand language, revised periodically

Rand McNally Motor Carriers' Road Atlas, Rand McNally & Company, 52 pgs

State Regulations for Private Truck Operators, Private Truck Council of America, gives concise explanation on various State laws affecting the private carrier, revised periodically

Unit 5.6 (continued)

Summary of Size and Weight Limits, State Laws Department of American Trucking Associations (same address as Safety and Security Department) order number SL 0040, a State by State summary in table form of size and weight limits

Truckers Atlas for Professional Drivers, Creative Sales Corporation, 376 pgs

1984 Trucker's Almanac, J.J. Keller and Associates, covers 21 sections dealing with State size and weight regulations, reciprocity, proration, ports of entry, exempt commodity hauling, rest areas and low underpasses

Unit

American Roadmasters, American Trucking Associations, 16 mm color film, helps drivers to understand how to present a better public image while driving safely and economically, 28 minutes

DOT Audit Guide, Private Truck Council of America, explains how to audit your own fleet operation for compliance with the Federal Motor Carrier Safety Regulations, illustrates record forms needed for compliance, which may be duplicated

Five to Drive By, National Safety Council, (professionalism in driving), slide show, 30 slides and script book

Five Points of Pride, Greater Los Angeles Chapter - National Safety Council, 16 mm film covering 5 basics that all good pro drivers follow: driving with skill; obeying the law; driving economically; being on time and keeping good will; 10 minutes

How and Where to Check Driving Records, American Trucking Associations and J.J. Keller and Associates can supply manuals giving all information necessary to check a driver's past driving record on a State-by-State basis

Just One Road, American Trucking Associations, 16 mm color film helps motorist and professional drivers understand one another better, 14 minutes

More Than Maneuvers, National Safety Council, (courtesy in driving), film, 16 mm, color, 10 minutes

Personnel Record Forms, American Trucking Associations or J.J. Keller and Associates can supply applications for employment, D.O.T. Physical Examination forms, certificates of road test and written examinations, annual review of violations record forms and complete driver qualification kits

Unit 5.7 (continued)

Sharing the Road, American Trucking Associations, 16 mm color film, designed to motivate professional drivers regarding sharing roads with the public, 16 minutes

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General Motors Corporation
Flint, MI 48556

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Glendale, CA 91201

Aetna Life & Casualty Company
151 Farmington Avenue
Hartford, CN 06156

American Automobile Association
8111 Gatehouse Road
Falls Church, VA 22042

American Bosch
3664 Main Street
Springfield, MA 01107

American Trucking Associations, Inc.
ATT: Safety and Security Department
1616 P Street, NW
Washington, DC 20036

Auto Club of Southern California
Terminal Annex, Box 2890
Los Angeles, CA 90051

Bendix Corporation
Heavy Vehicle System Group
Elyria, OH 44035

Bumpa-Tel, Inc.
P.O. Drawer A
Cape Girardeau, Missouri 63701

Bureau of Motor Carrier Safety
ATT: Regulations Division
400 Seventh Street, NW
Washington, D.C. 20950
(202) 426-1700

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Joseph Lucas No. America Inc.
30 VanNostrand Avenue
Englewood, NJ 07631

Channing L. Bete, Co., Inc.
45 Federal Street
Greenfield, MA 01301

California Traffic Safety Foundation
4111 Broadway
Oakland, CA 94611

Clark Equipment Company
1300 Falahee Road
Jackson, MI 49203

Creative Sales Corporation
762 West Algonquin Road
Arlington Heights, IL 60005

Cummins Engine Company, Inc.
1000 Fifth Street
Columbus, IN 47201

Direct Safety Company
7815 South 46th Street
Phoenix, Arizona 85040

E.I. Dupont de Nemours & Co., Inc.
Applied Technology Division
Wilmington, DE 19898

Eaton Corporation
North American Headquarters
Transmission Division
Kalamazoo, MI 49003

Film Communicators
11136 Weddington Street
North Hollywood, CA 91601

The Film Library
International Safety Academy
PO Box 76146
Los Angeles, CA 90076

Ford Motor Company Film Library
The American Road
Dearborn, MI 48121

General Motors Corporation
Public Relations Staff
Film Library
General Motors Building
Detroit, MI 48202

Greater Chicago Safety Council, Inc.
10 North Clark Street
Chicago, IL 60602

Greater Los Angeles Chapter of the
National Safety Council
616 South Westmoreland Avenue
Los Angeles, California 90005

The Hartford Insurance Company
Hartford Plaza
Hartford, CT 06115

Hyster Company
Industrial Truck Operations
PO Box 847
Danville, IL 61832

Hyster Company (for catalog)
Marketing Training Department
PO Box 2902
Portland, OR 97208

Indiana University
Audio-Visual Center
Bloomington, IN 47401

Industrial Training Aids
Box 326
Naperville, IL 60540

Institute of Driver Behavior
PO Box 165
Grosse Ile, MI 48138

International Loss Control Institute
PO Box 1997
Atlanta, GA 30301

International Training Consultants
99 East Magnolia Blvd, Suite 113
Burbank, CA 91502

Intext, Inc.
Driver Testing Equipment Division
925 Oak Street
Scranton, PA 18515

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10575 Katy Freeway
PO Box 19600
Houston, TX 77024

International Safety Academy
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PO Box 76146
Los Angeles, CA 90076

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Neenah, WI 54956

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National Audiovisual Center
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National Fire Protection Association
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Boston, MA 02210

National Safety Council (NSC)
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Chicago, IL 60611

New York State College Film Library
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Cornell University
Ithaca, NY 14850

North American Van Lines
Director of Training
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Fort Wayne, Indiana 46801

Prestolite Company
Technical Service Department
511 Hamilton Street
Toledo, OH 43602

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Washington, DC 20036

Rand McNally & Company
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Chicago IL 60680

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Advertising Department F-O
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North Hollywood, CA 91605

Shell Oil Company
Public Affairs Department
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Houston, TX 77001

Standard Motor Products
Marketing Services Department
37-18 Northern Boulevard
Long Island City, NY 11101

Transportation Industry
Consultants, Inc.
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Birmingham, AL 35223

U.S. Department of the Interior
Mine Enforcement and Safety Admin.
4800 Forbes Avenue
Pittsburgh, PA 15213

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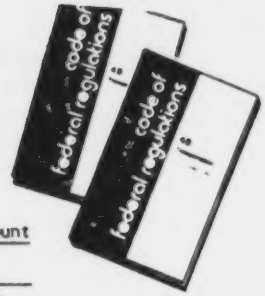

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SCHOOL FACILITIES

This section of the School Administrator's Manual will describe the types of facilities required to teach the Curriculum:

- o Range facilities
- o Vehicle Service facilities
- o Classroom facilities
- o Street Training Routes

RANGE FACILITIES

The Curriculum requires the use of Range facilities for teaching Basic Vehicle Control (Section 1) as well as advanced skills (Section 3). This section discusses the dimensions, surface markings and structures appropriate to a Range facility.

Dimensions

The size of the Range will depend upon the nature of the exercises to be carried out upon it.

Single Range

To carry out all of the learning activities within the curriculum, including skid pan training, would require a Range facility with a minimum paved area 900 feet by 150 feet. Most important is providing a margin of safety around the perimeter of the maneuver area (approximately 25-50 feet where space permits) in case a vehicle leaves the exercise area. Also, a sufficient acceleration approach lane and a sufficient deceleration run-out area must be allowed. The length of the acceleration and deceleration area would depend upon the speed that the test vehicle is required to achieve for each particular exercise (these are particularly important in setting up a skid pan). These distances must be checked carefully. The instructor should dry run each maneuver (before it's attempted by the student) with the test vehicle(s) to be used to ensure proper set up and to determine any limitation of the maneuver, vehicle or dimensions of the area involved.

Multiple Facilities

It is not necessary to have or use a single Range area. A school might use a small area (e.g., school yard, parking lot, or street in front of a school) approximately 300 feet by 100 feet to conduct the initial lessons in putting a vehicle in motion. Utilizing whatever space is available to the school in the form of a yard or vacant lot, parking area, adjacent street, etc., allows schools without Range facilities to conduct initial Range exercises at their convenience, at a minimal cost and without taking students out into traffic before they are prepared for such activity.

If the larger facility needed for the bulk of the Range exercises has to be rented, utilizing whatever space is available to the school as mentioned above will cut down on the total rental cost. If would also allow use of a Range facility that might not be available on an everyday basis. Range areas suitable for temporary use can be found in commercial or municipal parking lots, schools, national guard armories, military posts or unused air strips.

An area 500 feet by 150 feet would be sufficient space to conduct all necessary Range exercises in the curriculum with the exception of the skid pan. An area 300 feet by 150 feet is a recommended minimum area for a skid pan with an in-line approach lane 600 feet long for acceleration.

Surface

The surface of the Driving Range must be capable of supporting the weight of an unloaded tractor-trailer. It must be flat, free of dips or bumps, and have a sufficient grade to allow water to run off the surface. A one-percent grade is ideal.

Basic Surface

Many schools have started with unpaved areas surfaced with crushed gravel and then paved them later. The weight of the tractor-trailers compresses the crushed gravel allowing it to serve as an acceptable base. Ultimately, the driving area must be constructed of high quality paving material such as asphalt or concrete, if it is to be used in all seasons, for all of the lessons of the Curriculum. It is desirable to spread a very light coating of clean, light sand over the surface, particularly at places where the vehicle will turn, in order to reduce friction when trailer tires scrub the pavement. On very hot days, it may be desirable to wet the surface in order both to reduce heat and to lubricate the surface to prevent it from being gouged as the trailer wheels scrub it. That portion of the Range used as a skid pan should have a smooth surface and be coated or sealed with some sort of low friction substance. Four types of low friction substances and their use are discussed below.

Low Friction Surfaces

For skid pan training it is desirable to minimize the friction of the Range surface. The lower the friction the slower the vehicle speeds that may be employed.

Coal Tar Emulsion Sealer

Many different brands are available. The type used to seal driveways such as "Jennite" is ideal. Several coats of "Jennite" should be applied. While the sealer can be sprayed on with specialized machinery, hand application with a squeegee will also ensure a smooth finish. It is generally

available in 5-gallon tins and 55-gallon drums. One gallon of "Jennite" will cover approximately 100 square feet of surface area. One coat should be applied going in one direction and allowed to dry, then a second applied at right angles, e.g., coat one applied east to west, and coat two north to south.

A water source is essential, so unless there is convenient access to a nearby hydrant, a water line must be provided. A fire hose and spray nozzle should be used to keep the pan wet enough so that reflections can be seen in the water. Note that the entire skid pan should not be wet--only the maneuvers area. If the entire pan were wet, a skidding vehicle could continue to slide off the pan and injure someone or be damaged itself. The skid pan should be designed so that runoff water does not wet the acceleration line.

Soap Flakes

Commercially marketed soap flakes used in service stations to clean service bays provide an inexpensive way to create a low friction surface. The flakes can be used on any aggregate surface, and do not require a constant flow of water. They are big, usually the size of silver dollars, and generally come in 50-pound bags or 55-gallon drums. The maneuvers area of the skid pan needs to be wet before the flakes are applied. They should be spread evenly over the wet surface and then the maneuvers area should be wet down again to attain the proper surface condition. The problem with this method is the difficulty in keeping all surfaces uniformly slick and/or the need to constantly apply water due to evaporation.

Oil Surfaces

Many schools have spread oil over an asphalt surface in order to obtain a coefficient of friction that is lower than that afforded by water. The reduced coefficient of friction allows skid control and recovery maneuvers to be performed at speeds that are substantially lower than those required on a wet surface. The lowered speeds, in turn, permit the dimensions of the skid pan to be greatly reduced. Skid training of automobile drivers has been given in areas as small as 100 x 100 feet. This not only limits the size of the real estate investment required, but permits training to take place near schools that do not have enough land available for a large skid pan.

Offsetting the reduced dimensions are the problems created by the oil itself. The most noticeable of these problems is the mess it creates. Vehicle exterior and underside must be cleaned frequently, to say nothing of the clothes of students, instructors, and other personnel.

The second problem is the need for a recirculation system. Because of the cost of oil and the difficulty of legally disposing of it, a system of recirculating the oil must be built into the range. This not only adds cost but limits the size of the range area. The cost of equipping an area large enough to accommodate tractor-trailers would be extremely great, if not prohibitive.

Finally, oil complicates such aspects of range training as placing and resetting traffic cones and maintaining a dry buffer zone around skid pan area.

Water Soluble Polymers

Polymers can be mixed with water to create extremely low coefficients of friction. One such polymer is Union Carbide's "Polyox Resin," an ethylene oxide polymer developed for use in brewing beer (a foam stabilizer) and in other food products. The substance is completely nontoxic and, when mixed with water and spread over concrete or asphalt areas, reduces friction to approximately 20 percent of that of water. Being water soluble, it can be washed off a Range area following its use without any environmental problems and returns the Range to its original coefficient of friction. Although no recommendation converning its use can be made, informal tests indicate the probuct has great promise towards converting any paved surface into a skid pan rapidly and inexpensively.

Surface Markings

For maximum flexibility in conducting Range exercises, it is recommended that no permanent delineations be provided, such as curbs, grass or painted lines. No matter how certain or complete a Range layout may seem, changes are inevitable. When permanent delineations are used to make a Range, a school drastically reduces its flexibility and it may result in costing the school valuable time and money as well as much inconvenience. The following items can be used in setting up Range exercises on a temporary basis:

- Movable traffic cones or flags--Locations of cones may be marked with spray paint. Different colors may be used to indicate cone locations for various exercises. Marking cone locations expedites the setting up of exercises, and allows students to be used as helpers. Recommended size of cones or flags is 12 to 18 inches.

- Portable barricades and curbing--It is recommended that barricades be at least 10 feet long and 4 feet high. By installing rollers on the barricades transporting them to and from storage as well as from exercise to exercise becomes much easier.

- Metal, plastic or fiberglas drums--Drums are usually seen more easily than cones or flags by the student, especially if painted a bright color (e.g., orange or red). They are better for marking actual areas (e.g., braking point, exercise entrance) than are the cones or flags.

Movable objects have the following advantages over permanent delineations:

- They provide only one set of markings for each exercise (superimposing delineations can create a jumble).

- They permit exercises to be changed if the first exercise proves inadequate.

- They let locations of exercises be moved periodically to minimize wear on the Range surfaces.

- They prevent students from establishing "Landmarks" by which to aid themselves in performing the exercises, as opposed to the use of judgment, skill and timing that they should be developing thru practice.

Structures

The Range should be as free of structures as possible to avoid limiting Range activities and to minimize the chances of collision. Only the following structures are recommended:

- Light Standards--If night classes are to be conducted, standards should be placed around the perimeter of the Range. Every effort should be made to avoid placing them within the Range area itself.

- Fencing--The off-street area should be enclosed by a fence or other barrier to prevent access by the public during Range operations.

- Enclosures--Some form of shelter (e.g., shed, movable trailer, etc.) should be present to store equipment. It should be completely enclosed to minimize the chances of theft or vandalism. Nighttime illumination also provides a form of security.

VEHICLE SERVICE FACILITIES

Schools should have the necessary facilities for routine vehicle preventive maintenance. As a minimum, this should include a sheltered garage area sufficient to permit servicing of tractors regardless of weather conditions.

Service facilities should provide some access to the vehicle from underneath. This may be either a pit or a lift. The advantages of a pit are:

- easier servicing of most vehicle components.

- lower cost.

- allows students to examine underside of vehicle without disruption.

CLASSROOM FACILITIES

While the Curriculum imposes no unique requirements for classroom facilities in terms of either their size or configuration, facilities should be sufficient to accommodate the recommended number of students (12). In selecting classroom facilities, the administrator should give consideration to a number of factors which can influence the overall quality of instruction, instructor-student interaction, and classroom comfort. The more important of these are

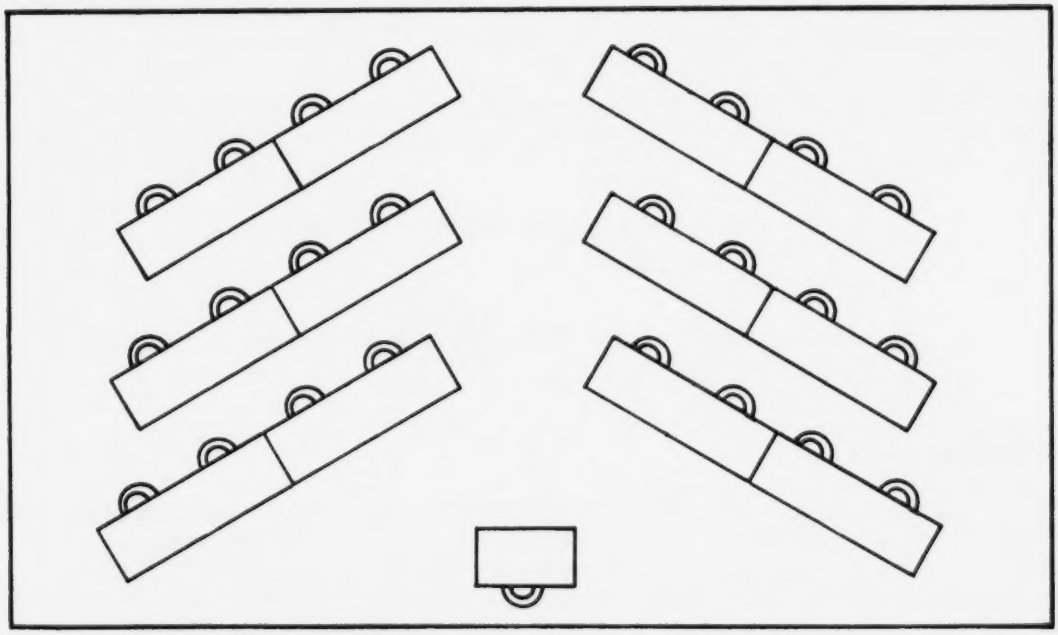
- o arrangement of classroom furniture
- o classroom lighting
- o classroom ventilation/temperature
- o storage
- o instructor workspace.

Arrangement of Furniture

The arrangement of classroom furniture, i.e., student desks and instructor podium, can have a substantial impact on student learning. Student desks should be arranged so that all students have a clear view of the instructor and any visual aids the instructor might employ. Student interaction is facilitated if seating is arranged so students can see one another, although this is not necessary.

Even though the Curriculum does not specifically require the use of films or other visual aids, these should be used and when employed, a center aisle of sufficient width to permit the unobstructed operation of projectors should be maintained.

A recommended arrangement of student and instructor furniture in the form of a chevron is presented below.



This arrangement provides a number of advantages:

- o Unimpeded view of instructor and/or visuals from all seating positions.
- o Easy student access to seats.
- o Some opportunity for student interaction.
- o Center aisle for operating projectors, transporting training aids or equipment, etc.

While this particular arrangement need not be employed, any arrangement selected must provide an uninterrupted view of instructor and aids, access to seats, and space to move and examine training aids. Facilities chosen need not be unnecessarily lavish, as the majority of training is conducted in the vehicle.

Classroom Lighting

General overhead lighting, either incandescent or fluorescent is sufficient for all classroom training activities. Fluorescent is preferred because of its low heat and nonglare properties. Student or instructor desk lamps are not required. Illumination level should be of sufficient intensity to permit reading of student materials and note taking.

If visual aids other than overhead viewgraphs are employed in instruction, some provision should be made for dimming lights by either:

- o Multiple switches controlling groups of lights.
- o Variable brightness light switches.

Should the classroom be equipped with windows, blinds or curtains will be necessary for blocking light when visual aids other than overheads are used in instruction.

Ventilation/Temperature Control

Student and instructor comfort during training will be improved with adequate ventilation and temperature control. While facilities need not be air conditioned in most climates, provisions for ventilating classrooms with fresh air must be provided. Where training is conducted in winter months, classrooms must be heated.

Storage of Materials

If possible, storage space accessible from the classroom should be made available for the storing of

- o student materials
- o training aids
- o reference materials

Student Materials

Student materials utilized during classroom instruction, such as test forms, student workbooks, etc., should be stored to lend easy access by instructors. The storage of these materials in the classroom (or in an area adjacent to the classroom) can increase the efficiency of instruction and minimize time lost when procuring these materials as needed. Such storage need not be secure and could consist of nothing more than a set of shelves sufficient to house supplies necessary for a single class. Materials can then be restocked as needed from general supplies for each new class.

Training Aids

Training aids and training equipment such as mock-ups, cut-aways, models, etc., should be stored in a central area easily accessible from the classroom (if not stored in the classrooms themselves). Storage should be arranged so that the instructor has ready access to these aids and equipment throughout the course of classroom instruction.

Reference Materials

Reference materials should be provided for student and/or instructor use, and they should be stored in an area accessible at all times during the training day by both students and instructors. Examples of reference materials include special-interest magazines, professional journals, and reference texts. This storage space need not be extensive or necessarily secure. It should merely allow students and instructors easy access to the use of these materials.

Instructor Workspace

It is desirable that a separate instructor workspace be provided, although not required. Any space provided should include at least one desk and an equipment locker for storing instructor equipment used during most training days.

This space may be shared. There is no requirement to provide separate space for individual instructors, or for that matter, individual desks or equipment lockers. The space should be sufficient in size to permit a number of instructors to utilize it at the same time. It can also be used by instructors to work with students on an individual basis.

Instructors' workspace should be accessible to the classroom, but not a part. It should also be reachable without entering the classroom first. This permits individual instructors not involved in classroom training access to the workspace without interrupting classes.

STREET TRAINING ROUTES

Street training routes must represent the broadest possible range of characteristics with respect to the following itmes:

Number of Lanes-Two-Lane, multi-lane.

Setting-urban, suburban, rural.

Configuration-straight, curved, ramps.

Grade-steep, gradual (long), uphill, downhill.

Structures-bridges, tunnels, railroad crossings.

Density-open, bumper-to-bumper.

Access-unlimited, limited (freeway).

Special Zones-hopsital and school zones; industrial and commercial zones, and truck routes.

Basic road skills (Unit 1.8) should be taught on roads with an absolute minimum amount of traffic. It is essential that these routes be as uncomplicated (i.e., no tight turns, difficult intersections, etc.) as possible. When students become more proficient, two lane roads with steep hills and curves should be used to introduce the necessity of gear shifting. Thereafter, routes should gradually go through larger towns and cities. Freeways or expressways, bridges, tunnels, railroad grade crossings and other "special requirement" driving situations must be worked into these routes as much as possible within the limits placed upon the school by its geographic location. Schools that are located in rural areas will have to incorporate more extensive practice road trips into their curriculum to reach areas where these conditions exist. The intent is to give students full exposure and practice in such situations. During the final stages of training, heavy use of routes in urban traffic, including trips into central business districts and commercial areas (factories, piers, and warehouses) are necessary to give the student full exposure to maneuvering skill and resulting stresses.

Every effort should be made to lay out as many routes as possible to avoid having students covering the same areas so many times that they become memorized, thereby eliminating the challenge posed by exposure to new situations.

STUDENT RECRUITMENT

The manner in which students are recruited for enrollment in school courses is not an aspect of school administration that is influenced by the Curriculum. The only aspect of recruitment upon which the Curriculum would have any impact is the characteristics of the prospective students who are recruited.

Satisfactory completion of the Curriculum will require attaining high levels of proficiency in the achievement of a broad array of instructional objectives. Not everyone has the basic aptitude required to reach the levels of proficiency involved. To recruit as students individuals who have no hope of successfully completing the course is certainly a disservice. Even if the students are later turned away in the selection process, expectations will have been created and often times, important life changes will have already been made. Even worse, some students, once committed, will manage to survive the selection process, enroll in training, spend time and money and end up failing to graduate, get a license, or obtain a position as a driver.

The requirements for graduation, licensing, and earning a livelihood in the trucking industry will be described in the next section. These requirements must be made known during the recruitment process so that individuals who cannot meet them will be aware of it and not seek enrollment.

STUDENT SELECTION

The selection of students for training is one of the most important, and probably one of the least well practiced elements of tractor-trailer driver training. Many training organizations operate under an implicit or explicit policy of admitting any person who may wish wish to receive instruction, regardless of their ability to obtain a graduation certificate, license, or job.

Admitting students without assessing their qualifications is not only a disservice to the student, but can work against the school as well. Students who invest sizeable amounts of time and money in learning to operate a tractor-trailer, only to discover that they are not qualified to obtain a job, may bring action against the training organization. If it is established that the organization made no effort to determine the student's qualifications or, worse yet, knowingly admitted an unqualified student, the organization might be both civilly and criminally liable.

This section will examine the qualifications that are important to successful completion of the Curriculum and the processes by which student qualifications can be assessed and evaluated. The reader should consult the BMCS Standards for minimum enrollment requirements.

QUALIFICATIONS

There are a number of characteristics of individuals that strongly influence their ability to successfully complete tractor-trailer driver training in general and the Curriculum in particular. As noted in the previous section, these qualifications should guide the Recruitment as well as Selection process. The qualifications to be addressed include the following:

- Age
- Mental requirements
- Physical requirements
- Driving ability
- Driving record

Age

At a minimum, a student should be old enough to be able to operate a vehicle "for hire" upon completion of graduation. In some States the age is 18 while in others it is 21. To be certified to drive in interstate and/or foreign commerce, Part 391 of the Federal Motor Carrier Safety Regulations require that a driver be at least 21 years of age.

While drivers who meet the minimum age requirements are legally qualified to operate a vehicle for hire, the chances of having an opportunity to do so are very slim. Most carriers are reluctant to employ any driver under the age of 25 because of the high insurance premiums they must pay. Those carriers that provide the better paying job and working condition can afford to be selective and, therefore, almost never employ drivers under 25. By the same token, jobs that are available for younger drivers tend to be low-paying and characterized by less than desirable working conditions.

Schools may reasonably accept applicants under the age of 25 so long as they make it perfectly clear what the applicant's job prospects will be. Many can qualify to drive for local carriers, using the time to gain experience so that, when they do reach the age of 25, they will have become attractive candidates for the more lucrative positions. They should recognize, however, that they may only be able to gain employment as assistant drivers, delivery men, or yard jockeys, or more likely terminal dock (platform) workers.

Schools should strongly discourage anyone under the age of 21 from enrolling in tractor-trailer driver training, even if the State does license "for hire" drivers at lower ages. With few exceptions, by the time the driver is able to earn a job operating a tractor-trailer, the skills acquired during training would likely be lost. Those under the age of 21 who are interested in driving a tractor-trailer should be encouraged to obtain employment driving a straight truck (locally) and postpone any attempt to learn tractor-trailer operation until they are older.

Mental Requirements

Under Federal Motor Carrier Safety Regulations, individuals driving in interstate commerce must be able to read, write and speak English. To be able to get a job with an interstate carrier, however, they must be able to do more than read and write. The mental demands placed upon an interstate driver are made quite formidable by such tasks as maintaining daily logs and recaps, handling cargo documentation, learning and complying with the regulations of different States, and handling other aspects of paperwork frequently imposed upon drivers. Moreover, a truly safe and efficient driver must have an understanding of the vehicle's internal operation as well as the way in which its operation is affected by the external environment. Students whose mental ability is marginal will have difficulty gaining such understanding. The mental demands of interstate tractor-trailer operation are reflected in the content of the Curriculum. Any person who is not of at least average intelligence is not likely to pass a course such as this Curriculum.

Certain special abilities demonstrated a significant relation to success in driving commercial vehicles, as measured by both safety record and longevity on the job. Some tractor-trailer driver aptitudes are:

Attitude--While no one attitude seems related to safety or success, attitude measures have been developed to predict accidents.

Personality--Drivers who are impatient, emotionally unstable, highly competitive, or preoccupied tend to have higher accident rates.

Reaction Time--There is a very slight tendency for drivers with fast reaction time to have fewer accidents when age is held constant.

Reading Ability--There is a relationship between reading ability and safe driving although it may be due to socioeconomic factors rather than reading itself.

While the relationships between these aptitudes and successes of driving commercial vehicles are statistically significant, it is not very strong. All of the aptitudes that we can measure, when put together, don't account for any more than 10 percent of what leads to success. Therefore, while measures of these aptitudes can help to pick out the best candidates for the job, they cannot be used as readily to screen prospective students. Any attempt to use them for this purpose would screen out almost as many of the promising as of the unpromising. However, students who are extremely deficient in one or more of the aptitudes underlying their successful career as a professional driver, should certainly be apprised of their limitations and what it indicates for the prospects of a successful career.

Physical Factors

Students who wish to operate a tractor-trailer should meet the physical requirements established in Part 391, of the Federal Motor Carrier Safety Regulations. A brief summary of these requirements follows:

Vision
- Accuity--Correctable to 20/40 in each eye
- Field--70° in each eye
- Normal color vision

Hearing
- Loss no greater than 40 decibels (be able to hear a forced whisper at 5-feet)

Limbs
- No loss of limb (unless granted a waiver) under Section 391.41
- No impairment that interferes with normal vehicle operation

No disease likely to cause loss of consciousness, including epilepsy, coronary disease, diabetes, or high blood pressure

No respiratory conditions likely to interfere with vehicle operation No mental, nervous, or psychiatric disorders capable of interfering with safe driving

No current diagnosis of alcoholism or drug use

In addition to meeting all of the physical qualifications, students desiring to be tractor-trailer operators must have sufficient physical strength and stamina to operate a vehicle for long periods (up to 10 hours) and to fulfill cargo handling responsibilities.

Drivers who cannot meet physical requirements for interstate certification must be apprised of their limitation and its likely effect upon their career potential. Any student who is unable to meet physical requirements imposed by the State upon operators "for hire" should be counselled out of training. If there is any doubt about a students' ability to meet physical requirements, the student should be encouraged to have a physical examination and obtain a completed report from the physician. All students should be given or required to take a vision and hearing test as a protection to instructors and other students. However, it is highly recommended that all prospective students be given a copy of the physical examination contained in the Federal Motor Carrier Safety Regulations and told to check with their personal physician to make sure that they qualify, prior to being enrolled. This is also good legal protection for your school.

Driving Ability

A tractor-trailer is not the appropriate place in which to learn to operate a motor vehicle. All applicants should have a valid driver's license and at least 1-year (four seasons) of driving experience before being accepted as a student in a tractor-trailer driving program. Students who not know how to drive will have too much difficulty in learning to control the motion of the vehicle to absorb instruction in safe operating techniques. Since there is little chance that they will be able to keep up with the class, their enrollment in school tends to become an administrative headache.

Applicants who already have a license for automobiles, but whose ability is suspect should be taken for a test drive to assure that they have both the manipulative ability to control a vehicle, and the information processing ability to be able to cope with heavy traffic conditions. Applicants who lack the ability to drive a motor vehicle must be told to wait until they've gained driving experience before enrolling in this course, as this curriculum assumes the student already has at least 1 full year (four seasons) of automobile experience prior to enrollment.

DRIVING RECORD

Students in tractor-trailer driving programs tend to come from that age segment of the population that is most overrepresented in accidents and traffic violations. One or two accidents or violations is not a bar to success in finding a job as a professional tractor-trailer driver, particularly if the driving record is clean over the past 3 years. However, a long record of violations is likely to disqualify a driver from a position with a motor carrier. A driver whose record includes one or more of the following offenses may be disqualified from interstate operation under Federal Motor Carrier Safety Regulations:

- o License suspension or revocation
- o A conviction for alcohol or drug-related offense
- o A crime involving a felony or transportation of drugs
- o Leaving the scene of an accident involving injury or death

While drivers with any of these disqualifying offenses may, with a clean record ranging from 1 to 3 years, qualify for employment with an interstate motor carrier, the immediate prospects are not good enough to warrant the student's undertaking training while these offenses are still on the record.

SELECTION PROCESS

The process by which students are enrolled in a tractor-trailer driver course should include submission of an application form, an interview, and testing.

Application Form

Each school should have available a standard application form calling for, at a minimum, the following information:

- Name
- Date of birth
- Marital status
- Home address and telephone number
- Address and telephone number while at school
- Name, address, and telephone number of individual to be notified in case of accident or illness
- Present occupation and past 3 years employment history
- Driver license number
- License expiration date
- Date first license was issued
- Types of vehicles
- Licensed to operate
- Number of miles driven last year, by vehicle type
- Accidents and violations over the past three years
  - Brief description of violations and accidents
  - Violations for which applicant was convicted
- License suspension/revocation in the past three years

Interview

Applicants whose application form reveals no obstacle to successful completion of the course for employment as a tractor-trailer operator should be interviewed by a representative of the school's administrative staff. The interview should be quite straightforward, involving the trading of information necessary for both the prospective student and the administrator to make an intelligent decision concerning enrollment in a tractor-trailer driver training course. This information should include the following:

Information About the Course--The nature of the course, the time commitment required, and financial arrangements involved should be candidly presented.

Background Information--Information about the applicant's background not fully contained on the application form should be obtained, including employment history, criminal record, credit record, and health.

Observation--The interview provides an opportunity for the administrator to look for observable characteristics related to employability, including physical health, appearance, and personality.

Instructional and Employment Prospects--The administrator should provide a frank appraisal of the applicant's likelihood of completing training successfully and obtaining the position sought.

Testing

Applicants who, after completing the interview, are judged suitable for enrolling in a tractor-trailer driver training course, and choose to do so, should be subjected to limited testing to verify their ability to handle the instruction. Brief tests of mental ability, reading, and arithmetic should be administered to screen out those who are not up to the mental demands of the course.

Tests of other factors bearing upon an applicant's aptitude for training and employment can also be administered. However, as noted previously, the relation between these measures and success as a professional driver is not sufficiently well established to make mandatory their use in screening out candidates.

The best source of information on available tests is the Eighth Mental Measurements Yearbook currently published by the University of Nebraska Press. This publication contains information on over a thousand tests, including descriptions of the tests, reviews of their reliability and validity, and sources of the tests themselves. The publication may be obtained by writing the University of Nebraska Press, 901 North 17th Street, Lincoln, Nebraska, 68588.

STUDENT FILES

A file must be established and maintained for each student who is enrolled in training. The file provides school administrators with a means of (1) readily determining the status of each student during the course, and (2) furnishing information to employers inquiring about a former student. A good recordkeeping system is an important adjunct to both instruction and the school's placement service.

The file maintained for each student should include at a minimum the following:

Application Blank--The original application blank provides a source of personal history information frequently needed by instructors, administrators, and perspective employers. Keeping application blanks on file makes it unnecessary for students to complete other forms addressing the same information.

Selection Forms--Copies of records compiled during the selection process should be maintained for use by school personnel and for making information available to perspective employers. Records that might be maintained in the file should include any tests taken during selection, copy of the student's driving record, and the physical examination record.

Training Records--Records compiled during instruction should be kept in the file. At a minimum, this would include the Student Master Record, showing daily performance and test scores, as well as results of unit tests, instructor reports or memos dealing with student performance or deportment, and any written information provided by students.

Governmental Forms--A copy of forms filled out to meet state and Federal requirements (e.g., permit and license application forms) should be maintained in the file for purposes of verification and for assistance if it becomes necessary to prepare the form a second time.

Final Examination Test Battery--The original of all forms used in the administraiton of these tests.

Placement Forms--A copy of forms prepared for placement purposes, such as resumes or basic job application forms should be maintained in the file so that they can be reproduced and forwarded to perspective employers as necessary.

Student Training Certificate-- A copy of this form as required by the BMCS Standards.

Check your State's record keeping requirements for tractor-trailer training schools to make sure you are in full compliance. Also check to determine if any of the Federal Trade Commission Regulations on record keeping apply to your type of school.

Record keeping should not cease with the students' graduation. While they may be transferred to an inactive file, records compiled on former students should be maintained for several years for the following purposes:

Placement--To assist students who are seeking new employment.

Regulation--To be able to provide information required by regulatory agencies concerning school enrollment, former students, etc.

Litigation--As a source of evidence in the event that the school or a former student is involved in litigation.

Research--To enable the school to provide statistical summaries or to determine relationships involving school population.

EVALUATING AND RECORDING STUDENT PERFORMANCE

STUDENT EVALUATION

Students shall be evaluated throughout training to assess their progress towards attainment of the instructional objectives of the Curriculum. In addition to these periodic evaluations, students must be evaluated comprehensively immediately before their first onstreet training sessions and immediately before graduation.

Student evaluation serves many purposes, including the following:

- o To advise students of progress or lack of progress so that those who are not going to meet Graduation Standards can be advised at the earliest opportunity. This is required so that students may make an informed decision as to whether they wish to continue with the course.

- o To identify students needing remedial instruction. All students will learn at different rates depending on their ability and aptitude for specific subjects. Students who are experiencing difficulty but who possess the necessary aptitude for masting course requirements must be provided with a reasonable amount of remedial instruction.

STUDENT RECORDS

The minimum requirements for student evaluation purposes are two forms - Duty Status Record (formerly called Driver's Daily Logbook) and The Student Master Record.

Duty Status Record. All students shall be issued a Duty Status Record meeting the requirements of Part 395 of the Federal Motor Carrier Safety Regulations. Unit 5.3, "Hours of Service Requirements" shall be taught as early as possible in the training course. Thereafter, all students shall be required to maintain records of all training throughout the remainder of the course. Each day, schools shall collect the original copy of the previous day's log from each student and critique it for completeness and accuracy and make it a part of the student's file. In no case shall students be allowed to participate in street lessons without a Duty Status Record in their possession in which all driving time and mileage shall be accuratley recorded. These records shall be carefully audited by school management to ensure that all students have received the minimum required BTW time and mileage specified in the BMCS Graduation Standards.

Student Master Record. Each school is required to establish and maintain a Student Master Record (hereafter referred to as Master Record) as part of the student's permanent record file. This Master Record is used for recording

- o student progress throughout training.

- o student attitudes.

- o test scores

Master Records for each student are to be completed by the instructor responsible for conducting training for that student (all or any portion thereof). A copy of this Master Record Form is presented at the end of this section.

Subjective Measures. Subjective measures of student performance, progress in attaining instructional objectives, and attitudes towards safe operation are taken by instructors throughout training. Each of these aspects of student performance is recorded on the Master Record to be retained by the school after training has been completed.

These subjective measures of student performance during training assist school administrators in

- o determining whether individual students will graduate
- o advising prospective employers of student attitudes towards safe and efficient operation of tractor-trailers.

They assist instructors in

- o tailoring instruction to meet individual student needs.
- o conducting instruction in as efficienct a manner as possible.

The procedures for rating student performance include the following:

- o Assessment of student progress.
- o Assessing student attitudes.
- o Recording of critical incidents.

Assessment of Student Progress - The assessment of student progress toward attainment of course objectives is indicated on pages 1 and 2 of the Master Record. Assessments are to occur following each day of training. If a student is absent, no entires are to be made on the Master Record. Each "day" is a day of student attendance, not a calendar day. If a student completes only a portion of daily training requirements due to illness, tardiness, etc., only those aspects of training completed should be assessed.

This approach to recording student performance permits the Master Record to be used regardless of the course scheduling option selected by the administrator or the student's attendance record. If desired, instructors may jointly assess each student's performance on completion of all daily training requirements.

Daily assessments are reviewed by the school administrator or chief instructor to determine the next day's training schedule for each student. The student's progress in achieving identified instructional objectives is recorded on pages 1 and 2 of the sample Master Record as follows:

A-indicates the student has achieved specific instructional objectives.

P-indicates the student is progressing satisfactorily, i.e., at a rate equivalent to other students and will achieve identified instructional objective.

R-indicates the student requires remedial training to attain instructional objectives.

N-indicates no training in instructional objective has been initiated due to training schedule, student absence, or alterations in training regimen. An N should be penciled lightly in each of these instances to remind the instructor of the training requirement. It should be erased and marked properly whenever training commences.

Instructors may refer to the checklists employed in each section of the curriculum for criteria used to determine whether or not the student is making satisfactory progress or has attained instructional objectives. The school administrator should periodically review instructors' use of ratings to ensure that proper rating criteria are being applied. This can be accomplished by

- o supervising the daily rating process.
- o periodically reviewing completed ratings.
- o requiring teams of instructors to determine ratings.
- o cross checking ratings with other instructors.

Assessing Student Attitudes - Student attitude is assessed, using the form on page 5, at the end of training by all instructors. The results of the assessment are entered on the Master Reocrd as numerical ratings for each of the five factors identified.

A rating scale of 1 to 5 is used on the sample Master Record. High ratings indicate proper attitudes; low ratings, improper attitudes. Ratings may be determined in one of two ways:

Group Ratings-The school administrator and instructors can decide upon individual ratings in a group meeting. Using this approach, the administrator would review all comments with instructors and decide upon the most appropriate rating. Care must be taken to ensure

- o rating process is not unduly influenced by one instructor or an instructor's personal biases.
- o rating values derived are based upon written comments and not a general impression of the student or behavior outside of class which does not affect in-class behavior.

Individual Ratings-If preferable, the administrator may have instructors rate student attitudes individually and then average the results to derive a single rating value. The advantage of this approach is that it prohibits an instructor from swaying opinions. A disadvantage is that it is more difficult ot ensure that instructors are using proper rating criteria.

Recording of Critical Incidents - The student's general attitude is assessed at the end of training prior to determining graduation status by reviewing the entries on pages 3 and 4 of the Master Record. Throughout training, instructors indicate on this form any noted evidence of improper attitudes including the following:

Learning-Unwillingness to participate in instructional programs, lack of interest in applying knowledges acquired during instruction, lack of interest in general, etc.

Classroom Conduct-Overall deportment in class including such behavior as sleeping, tardiness, inattention, disruptive behavior, and disobeying of instructions.

Instructors-Lack of respect for individual instructors or the instructional process.

Safety and Efficiency-Evidenced by willfull abuse of equipment, violation of safe operating principles, school safety requirements, etc.

Comments regarding student behavior indicative of proper or improper attitudes are made on a regular basis as specific instances occur. Entries should describe as accurately as possible the specific behavior observed; instructors should refrain from using such terms as "bad attitude" or "generally lazy." The following are examples of the kinds of entries that should be made:

- "Student arrived 20 minutes late for class with no valid excuse."
- "Student exceeded range speed limit by 15 mph."
- "Student refused to answer instructor's question."

Recording of Tests - All test and quiz scores should be entered by the instructor responsible for administering the tests on page 6 of the Master Record.

MAINTAINING THE MASTER RECORD

The Master Record is to be retained in the chief instructor's file for referral by instructors to enable them to review student progress prior to start of any lesson. This is particularly important to review prior to each onstreet training session, so that instructors can be alerted to any problems that a student may be experiencing. It is important that each instructor update each of his/her student's Master File as soon as possible after each lesson while information is still fresh in their minds. Administrator's must insist that in any case entries must be completed by each instructor before close of business each day.

STUDENT NAME: _____
(Last, First, Middle Initial)

STUDENT MASTER RECORD
(Page 1)

CODE:
A - Achieved instructional objectives
R - Remedial training needed
P - Progressing satisfactorily
N - No training to date

Training Day

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
BASIC CONTROL																					
Acceleration																					
Braking																					
Shifting																					
Uphill operation																					
Downhill operation																					
Speed adjustment/curves																					
Lane keeping/straight																					
COMMUNICATION																					
Signalling direction changes																					
Cancelling signals																					
VISUAL SEARCH																					
Distance scanning																					
Intersection scanning																					
Mirror usage/scanning																					
Mirror usage/speed-direction changes																					
SPACE MANAGEMENT																					
Following distance																					
Space cushion																					
Return to lane																					
Gap judgment																					
LANE USE																					
Upgrades																					
Multilane roads																					
Turns																					
NIGHT OPERATION																					
Use of hi/lo beams																					
Speed adjustment																					
Space management																					
TRAFFIC LAWS																					
Speed limits																					
Signs/signals																					
HAZARD RECOGNITION																					
Road conditions																					
Traffic conditions																					

STUDENT NAME: _____
(Last, First, Middle Initial)

STUDENT MASTER RECORD
(Page 2)

CODE:
A - Achieved instructional objectives
R - Remedial training needed
P - Progressing satisfactorily
N - No training to date

Training Day

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
BASIC CONTROL																					
Acceleration																					
Braking																					
Shifting																					
Uphill operation																					
Downhill operation																					
Speed adjustment/curves																					
Lane keeping/straight																					
COMMUNICATION																					
Signalling direction changes																					
Cancelling signals																					
VISUAL SEARCH																					
Distance scanning																					
Intersection scanning																					
Mirror usage/scanning																					
Mirror usage/speed-direction changes																					
SPACE MANAGEMENT																					
Following distance																					
Space cushion																					
Return to lane																					
Gap judgment																					
LANE USE																					
Upgrades																					
Multilane roads																					
Turns																					
NIGHT OPERATION																					
Use of hi/lo beams																					
Speed adjustment																					
Space management																					
TRAFFIC LAWS																					
Speed limits																					
Signs/signals																					
HAZARD RECOGNITION																					
Road conditions																					
Traffic conditions																					

TRAINING DAY NUMBER	COMMENTS	STUDENT MASTER RECORD (PAGE 3)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
20.		

TRAINING DAY NUMBER	COMMENTS	STUDENT MASTER RECORD (PAGE 4)
21.		
22.		
23.		
24.		
25.		
26.		
27.		
28.		
29.		
30.		
31.		
32.		
33.		
34.		
35.		
36.		
37.		
38.		
39.		
40.		

STUDENT NAME: _____
(Last, First, Middle Initial)

STUDENT MASTER RECORD
STUDENT ATTITUDE

RATINGS: 5 = Excellent 4 = Good 3 = Average 2 = Below Average 1 = Poor 0 = Unsatisfactory

TRAINING DAY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Common Courtesy																				
Self Control																				
Concern for Others																				
Sportsmanship																				
Safety: Risk Acceptance																				

TRAINING DAY

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Common Courtesy																				
Self Control																				
Concern for Others																				
Sportsmanship																				
Safety: Risk Acceptance																				

STUDENT NAME: _____
(Last, First, Middle Initial)

STUDENT MASTER RECORD
TEST SCORES

(Page 6)

TEST DATE	NAME OF TEST OR QUIZ GIVEN	PASSING SCORE	STUDENTS OWN SCORE	CLASS RANKING

IN-COURSE AND FINAL EXAMINATIONS

IN-COURSE EVALUATION

The Tractor-Trailer Driver Training Curriculum provides for the evaluation of student performance throughout training in the form of

(1) Objective measures of student performance consisting of

- written tests of student knowledge
- in-course driving range test of student performance
- end-of-course "Final Examination" tests of student knowledge and performance.

(2) Subjective measures of student performance in the form of instructors' ratings of

- student progress in attaining instructional objectives
- student attitudes toward training.

These measures have been designed to provide instructors and school administrators with a continual assessment of

Student Achievement--as measured by the attainment of specific instructional objectives.

Student Progress--in relation to the class as a whole.

Training Needs--remedial training required to elevate individual students to a satisfactory level of performance.

OBJECTIVE MEASURES

Objective measures of student performance are provided through the following tests:

- Written Unit Tests
- In-Course Driving Range Test
- Final Examination Test Battery:

  Part A--Written Knowledge Test
  Part B--Driving Range Test
  Part C--Street Driving Test

Written Unit Tests

Tests of student knowledge are administered following completion of each of the 29 Units in the curriculum. These are multiple choice tests, in which the student must select the correct answer from a list of 4 choices presented for each answer. Answer keys are provided for each test.

Each test has been constructed to provide an assessment of the student's attainment of specific knowledge objectives. The number of questions in each test varies, depending upon the number and nature of instructional objectives for each unit. Units which place a heavy emphasis on student knowledge are more extensively examined than those with less emphasis.

Both the content and scoring criteria for these 29 tests will be finalized during curriculum validation and will be added to this manual and to the Instructor Manual.

Driving Range Tests

Two forms of these tests are employed to assess student performance of range maneuvers. The In-Course Test is designed to assess the student's basic vehicle control abilities prior to initiating onstreet instruction. The End-of-Course Test has been designed to test the student's mastery of tractor-trailer operation in close quarters. The End-of-Course Test is a part of the Final Examination Test Battery.

The exercises for each version of the test are identical (only the scoring criteria is different). The 12 exercises are

- o Backing-Straight Line
- o Offset Alley
- o Alley Dock
- o Alley Dock (Jackknifed)
- o Serpentine (Forward)
- o Serpentine (Reverse)
- o Parallel Parking (Jackknifed)
- o Controlled Stop Line
- o Overhead Clearance
- o Pretrip Inspection
- o Coupling
- o Uncoupling

End-of-Course Evaluation

Equipment specifications and training instructions are contained in Unit 1.8 of the Instructor Manual. The specifications and scoring criteria for the In-Course (Pre-Street) Test is provided in this section of this manual under "Final Examination Test Battery, Part B-Driving Range Test."

Both the final specifications and scoring criteria for these 2 driving range tests will be finalized during curriculum validation and will be added to this manual, the Instructor manual and to the BMCS Proposed Minimum Standards for Training Tractor-Trailer Drivers.

END-OF-COURSE EVALUATION

The Tractor-Trailer Driver Training Curriculum provides for an objective evaluation of student performance through the use of a Final Examination Test Battery made up of 3 parts

Part A - Written Knowledge Test
Part B - Driving Range Test
Part C - Street Driving Test

These tests are described on the following pages.

FINAL EXAMINATION TEST BATTERY
PART A - WRITTEN KNOWLEDGE TEST

The items making up the Knowledge Examination are drawn from the knowledge objectives set forth in the BMCS Proposed Minimum Standards for Training Tractor-Trailer Drivers. The information called for in the test items is that most critical to safe and efficient operation of tractor-trailers. Any qualified operator should be capable of answering the questions correctly, regardless of the specific characteristics of the instruction that has been received.

To pass this examination, a tractor-trailer operator must:

- Answer 125 multiple-choice questions correctly.
- Fill out the Driver's Daily Log and Recap Chart correclty.

Both the content and scoring criteria for this test will be finalized during curriculum validation and added to this manual and to the BMCS Proposed Minimum Standards for Training Tractor-Trailer Drivers.

FINAL EXAMINATION TEST BATTERY
PART B - DRIVING RANGE TEST

The Driving Range Test, henceforth referred to as the Range Test (RT) is designed to evaluate the students' ability to control the motion of a tractor-trailer vehicle in relationship to the vehicle's surroundings. The RT is given through a series of exercises designed to measure a wide range of vehicle handling skills. The students are tested objectively on how well they perform the specific exercise maneuvers. The RT provides a standard measure of proficiency for any student in a tractor-trailer instructional program.

THE PURPOSE OF THE RANGE TEST

The RT is used to assess:

In-course Progress--These exercises are given during training prior to onstreet instructional sessions, as a pre-traffic instruction test. The RT is used to:

- Determine whether or not students are sufficiently skilled in vehicle handling to operate safely on the street.
- Determine if students have mastered vehicle handling skills to a sufficient level to benefit from on-street instruction.

End-of-course-Performance--The RT serves as the off-street portion of the Final Examination Test Battery. It is used to evaluate student performance of vehicle handling skills.

RANGE TEST EXERCISES

The RT consists of 12 exercises, which are

- Backing - Straight Line
- Offset Alley
- Alley Dock
- Alley Dock (jackknifed)
- Serpentine (forward)
- Serpentine (reverse)
- Parallel Parking (jackknifed)
- Controlled Stop Line
- Overhead Clearance
- Pretrip Inspection
- Coupling
- Uncoupling

The layout and procedures for these exercises are described later in the instruction for giving the test.

SCORING SYSTEM

Each exercise of the test is scored against a number of measures of performance. For each measure specific pass-fail criteria are provided.

Measures

Each exercise is scored in terms of specified performance measures. The measures have been chosen on the basis of (1) the ability of test

examiners to take accurate measures, (2) the importance of measures to vehicle handling and safety of operation. The four standard measures are:

Motion Control--The number of stops and direction changes. The final stop is not counted. When a student makes a stop and then changes direction of travel, he is scored on both criteria.

Contact--Violating the boundaries of the exercise area. Scoring covers:

- Touches: Operating with vehicle wheels on boundary.
- Hits: Bumping into a barrier and moving it out of position.
- Exceeds: Operating with vehicle wheels over the boundary or vehicle body extends over the exercise boundary even when wheels remain within.

Distance--Location of vehicle on completion of the exercise. Scoring is based on distance expressed in feet or inches; measure is always taken from front, rear or side of vehicle rather than from tire/wheel position.

Time--Total exercise time in seconds or minutes; time is always measured between two specific points, the designated start and finish areas for the exercise. An accurate stop watch is needed for timing.

Criteria

Student performance on each measure is scored using numerical criteria. Scoring is done on a simple YES/NO basis. If the student meets the criteria, score is YES; if the student does not meet the criteria, the score is NO. The criteria are described along with the measures, in the Test Instructions. They are also summarized in a Summary of Criteria (found at the end of the test) which is used as a simple reminder on the testing site.

Two sets of scoring criteria are provided for the RT one for In-Course Testing and one for End-of-Course Testing. Only the scoring criteria differ across the two administrations. The exercise instructions, dimensions, and measures remain the same. Criteria for performance are less strict for the In-Course test, especially for time to perform the exercises.

Termination of Exercise

An exercise may be terminated under any of the three following conditions:

Time--If the time taken by the student exceeds twice that of the time criterion. For example, if the time criterion on an exercise is 30 seconds, the exercise may be terminated after one minute.

Exceeding Boundaries--If the entire vehicle moves outside of the boundaries for the exercise.

Sliding the Trailer--If the wheels of the trailer are pulled or pushed so that they slide across the service of the range.

Any of these conditions indicate inability to perform the exercise. Allowing the student to continue could consume an inordinate amount of time and possibly cause damage to the vehicle or range surface and equipment. If in the examiners judgment, the student is not sufficiently skilled to handle the remaining exercises, the entire test may be terminated. In any case, the student should be scheduled for remedial instruction.

Total Score

The total score is obtained by adding the number of YES scores. A total of 47 yes scores is required to pass the test. The passing score is the same for the In-Course and the End-of-Course tests. Differences in the skill requirements for the two tests are accounted for by differences in the criteria upon which the score is based.

If conditions should prevent administration of all range exercises, students may be scored on a percentage basis as follows:

$$\text{Score} = \frac{\text{Number of YESs}}{\text{Number of YESs + NOs + N/As}} \times 100$$

For example: suppose the student only completed 37 out of the 63 items on the test, of these he got 25 "yes" scores, 12 were scored "no" and thus he had 26 "N/A" (not attempted). The score would be determined as follows:

$$\frac{25 \text{ YES}}{25 \text{ YES} + 12 \text{ NO} + 26 \text{ N/A}} \times \frac{100}{1} = \frac{2500}{63} = 39.6$$

Thus the students score would be 40 percent. A score of 75 percent or better is required to pass the test.

GENERAL GUIDELINES FOR THE RANGE TEST

The next Section, Test Instructions, provides specific procedures for administering each exercise. This section furnishes general guidelines for giving the test as a whole.

Introduction Instructions

The following items should be covered in instructions given prior to each exercise:

- o Name of examiner
- o Length of test-time
- o Speed--slow, i.e., 3 to 4 m.p.h. maximum (except for the controlled stop line exercise)
- o Gears--first or reverse for all exercises (except controlled stop line)
- o General scoring criteria--speed (i.e., timed), accuracy (i.e., avoiding barriers), necessity (i.e., avoiding unnesessary stops and direction changes)
- o Signaling of problems--flash lights, blow horn

These items may be communicated through oral or written instructions.

Exercise Instructions

Instructions for each exercise should be given in a manner that ensures students completely understand the requirements for the exercise. The following guidelines should be employed to ensure that student performance is not overly influenced by the manner in which instructions are given.

1. Use the wording provided for individual exercise instructions.
2. Give the instructions the same way each time the RT is administered.
3. Stand to the left side of the vehicle cab and look at the student as instructions are given.
4. Talk loud enough to be heard over vehicle noise.
5. Use gestures to clarify the instructions.
6. Give instructions in your own words; avoid reading the instructions.
7. Ask students if they understand the instructions.
8. Clarify any misunderstanding and answer any questions.
9. Repeat instructions or parts of instructions if students appear uncertain.

Exercise instructions may also be supplemented by hand signals.

TEST INSTRUCTIONS

This section describes exercise layout and setup procedures, instructions to the student and scoring criteria for each exercise. A score sheet is provided at the end of this test. On the reverse side of the score sheet is a summary of the scoring criteria.

To aid in making standard observations, guidance on the location of the test examiner is provided for each exercise. The initial location, movement during the exercise, and final location of the examiner is specified.

NOTE: Range exercise diagrams all show 3 sets of dimensions as follows: Setting A. is for beginner or novice students; setting B. is for intermediate level students; and setting C. is for advanced students. Setting A. is used for the In-Course Test and setting C. is used for the End-of-Course Test.

BACKING - STRAIGHTLINE

Purpose--To assess performance of student in handling a tractor-trailer on a restricted path while backing for an extended distance.

Exercise Layout

Layout dimensions:

- Lane length--150 feet
- Lane width (in-course) 13 feet
- Lane width (end-of-course) 11 feet
- Start and finish lines--11 feet long, 3-6 inches wide
- See Range Diagram in Instructor Manual, Unit 1.8

Required material:

- Line marking material for delineating lane boundaries as well as the starting and stopping lines (e.g., tape, chalk, etc.)
- Four cones or similar type objects (start and finish line identification)

Exercise setup:

- The lane boundaries are placed parallel to each other (11 feet or 13 feet) apart, extending 150 feet.
- The start and finish lines extend across the width of the backing lane. The line ends are marked with cones or similar type objectives placed on either side of the line (allows student to easily see location of line from the cab).

Exercise Instructions

- Position the tractor-trailer at the starting line, with the rear end of the vehicle towards the maneuver.
- Begin maneuver when I (administrator) give you a hand signal or voice command.
- Back vehicle through entire 150 foot lane as quickly as possible staying within its boundaries, without stopping unless necessary.
- Maneuver will be complete when vehicle crosses finish line.
- You (student) should complete the maneuver as quickly as possible, while keeping vehicle under control, and without making mistakes.

Scoring

Criteria (End-of-Course)

Motion Control

--Makes no directional changes and/or stops

Contact

--Does not touch lane boundaries

Time

--Completes maneuver in 60 seconds or less (timing begins when rear end of trailer crosses starting line and ends when tractor clears the finish line)[1]

Criteria (In Course)

Scoring criteria same as end-of-course, except time limit is 90 seconds.

Position of Examiner

- Center of backing lane, approximately 15 feet behind finish line.
- As vehicle approaches finish line examiner walks backward (allowing vehicle to clear line) keeping eyes on vehicle.

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1 In all time exercises, a stopwatch will be necessary.

OFFSET ALLEY

Purpose--Assesses performance of the student to laterally reposition the vehicle in restricted space while moving forward.

Exercise Layout

Layout dimensions:

- Two alleys required, each alley must be--11-feet wide and 10 feet long
- Starting line--11 feet 6 inches long, 3 - 6 inches wide
- Alley offset distance--11 feet (both in-and end-of-course)
- Distance between alleys--is the overall length of vehicle, plus 10-feet (in-course) and the exact overall length of the vehicle (end-of-course)
- See Range Diagram in Instructor Manual, Unit 1.8

Required material:

- Line marking material for delineating starting line
- Two cones or similar type objects (starting line identification)
- Four barricades each one 10-feet long, used to construct the 2 alleys

Exercise setup:

- Two alleys formed by using barricades that are each 10 foot long per alley, one to each side, placed 11 feet apart.
- The second alley is offset either 11 feet to the left or the right of the first alley, and must be in perfect alignment with the end of the other alley barricade (see Diagram).
- The starting line is placed 5 feet in front of the first alley.

Exercise Instructions

- Position tractor-trailer at the starting line with the vehicle facing the maneuver.
- Begin maneuver when I (administrator) give a hand signal or tell you to go.
- Move vehicle through the first set of barricades, turn (left or right) and proceed forward through the second set of barricades without striking barricades and only stopping when necessary.

- The maneuver ends when trailer passes the end of the last alley.
- You should complete the maneuver as quickly as possible, while keeping the vehicle under control, and without making mistakes.

Scoring

Criteria (End-of-Course)

Motion Control

--Makes no directional change and/or stops

Contact

--Makes no barricade touches or hits

Time

--Completes maneuver within 45 seconds. (Timing begins when tractor crosses starting line and ends when the rear of the trailer clears the end of the last alley).

Criteria (In-course)

Motion Control

--Makes no directional changes and/or stops

Contact

--Makes 2 or less barricade touches

--Makes 1 or no barricade hits

Time

--Completes maneuver within 90 seconds

Position of Examiner

1. Midway between the two alleys in line with the first alley.
2. As vehicle passes, examiner moves behind trailer, checking final alley.

ALLEY DOCK

Purpose--Assesses performance of the student to position the vehicle while backing in to a limited space and to stop the vehicle within a specified distance of the rear limits of that space.

Exercise Layout

Layout dimensions:

- Street length--approximately 200 feet (depending on length of the vehicle)
- Street width--50 feet
- Alley Dock depth--20 feet
- Alley Dock width--12 feet, 10 inches (in-course) and 11 feet, 8 inches (end-of-course)
- See Range Diagram in Instructor Manual, Unit 1.8

Required material:

- Line marking material for delineating street boundaries
- Five barricades Each 10 feet long for construction of the alley dock

Exercise setup:

- The street boundaries are placed parallel to each other 50 feet apart, extending approximately 200 feet
- Each side of the alley dock is composed of 2 barricades placed end to end making a 20 foot deep alley. Sides of alley are parallel to each other (12 feet, 10 inches or 11 feet, 8 inches) apart and are perpendicular to the street boundary delineations. The fifth barricade is placed at the end of the alley (splitting the difference between the two sides)
- The entrance to the alley is even with one of the street boundary delineators, and is 50 feet down street from the start of the street delineators

Exercise Instructions

- After I (Administrator) give you a hand signal, proceed to enter the street and staying within the delineators come to a stop on the side of the street opposite the alley dock, with your vehicle in proper position to back into the dock.

- After I (Administrator) give you a hand signal or voice command, back the vehicle with as few stops and direction changes as possible into the alley between the barricades, stopping as close to the rear of the dock as possible, without hitting it.

- The maneuver ends when vehicle comes to a complete stop at the end of the alley, and then blow your horn to signify you have completed the maneuver and are ready to be measured.

- You (student) should complete the maneuver as quickly as possible while keeping the vehicle under control, and without making mistakes.

Scoring

Criteria (End-of-Course)

Motion Control

--Makes no more than 2 direction changes and/or stops

Contact

--Makes no boundary touches

--Makes no barricade touches or hits

Distance

--Stops vehicle 12 inches (or less) from rear dock barricade

Time

--Completes exercise within 2 minutes and 30 seconds. (Timing begins when vehicle starts its backward movement and ends when it comes to a complete stop at the back of the dock and student blows horn signifying completion).

Criteria (In course)

Motion Control

--Makes no more than 4 direction changes and/or stops

Contact

--Makes no more than 2 boundary touches or exceeds boundary

--Makes no more than 2 barricade touches or hits

Distance

--Stops vehicle 24 inches (or less) from rear dock barricade

Time

--Completes exercise within 4 minutes and 30 seconds

Position of Examiner

1. As student pulls vehicle past alley dock, the examiner is positioned on the side of the street opposite of the alley near the street boundary delineation.

2. As vehicle starts backward movement, examiner moves position to the back of the alley approximately 15 feet behind barricade. (As trailer nears the end of the dock, the examiner gradually moves toward barricades.)

ALLEY DOCK - JACKKNIFED

Purpose--Assesses performance of the student to position the vehicle while backing in a space perpendicular to the vehicle.

Exercise Layout

Layout dimensions:

- Street length--approximately 200 feet (depending on vehicle)
- Street width--50 feet
- Alley dock depth--10 feet
- Alley dock width--12 feet, 10 inches (in-course) and 11 feet, 8 inches (end-of-course)
- See Range Diagram in Instructor Manual, Unit 1.8

Required material:

- Line marking material for delineating street boundaries
- Five barricades (alley dock construction)

Exercise setup:

- The street boundaries are placed parallel to each other 50 feet apart, extending approximately 200 feet
- Each side of the alley dock is composed of a barricade making a 10 foot deep alley. Sides of alley are parallel to each other (12 feet, 10 inches or 11 feet, 8 inches) apart perpendicular to the street boundary delineations. The fifth barricade is placed at the end of the alley (splitting the difference between the two sides)
- The entrance to the alley is even with one of the street boundary delineators, and is 50 feet down street from the start of the street delineators

Exercise Instructions

- After I (Administrator) give you a hand signal, proceed to enter the street and staying within the delineators come to a stop on the side of the street opposite the alley dock, with your vehicle in proper position to back into the dock.
- After I give you a hand signal or voice command, back the vehicle with as few stops and direction changes as possible into the alley between the barricades, stopping as close to the rear of the dock as possible, without hitting it.

- The maneuver ends when vehicle comes to a complete stop at the end of the alley, and then blow your horn to signify that you have completed the maneuver and are ready to be measured.

- Be sure the tractor-trailer is in the jackknife position (tractor 90° angle to trailer), when you finish the maneuver.

- You (student) should complete the maneuver as quickly as possible while keeping the vehicle under control, and without making mistakes.

Scoring

Criteria (End-of-Course)

Motion Control

--Makes no more than 2 or less direction changes and/or stops

Contact

--Makes no boundary touches

--Makes no barricade touches or hits

Distance

--Stops vehicle 18 inches (or less) from rear dock barricade, without touching or striking rear barricade

Position

--Leaves tractor at a 90° angle to the trailer

Time

--Completes exercise within 2 minutes and 45 seconds. (Timing begins when vehicle starts its backward movement and ends when it comes to a complete stop at the back of the dock and student blows horn signifying completion).

Criteria (In course)

Motion Control

--Makes no more than 4 direction changes and/or stops

Contact

--Makes no more than 2 boundary touches

--Makes no more than 2 barricade touches or hits

Distance

--Stops vehicle 30 inches (or less) from rear dock barricade

Position

--Leaves tractor at a 90° angle to the trailer

Time

--Completes exercises within 4 minutes and 30 seconds

Position of Examiner

1. As student pulls vehicle past alley dock, the examiner is positioned on the side of the street opposite of the alley near the street boundary delineation.

2. As vehicle starts backward movement, examiner moves position to the back of the alley approximately 15 feet behind barricade. (As trailer nears the end of the dock, the examiner gradually moves toward barricades.)

SERPENTINE - FORWARD AND REVERSE

Purpose--Assesses performance of the student in handling the vehicle in a limited space with obstacles in its path.

Exercise Layout

Layout dimensions:

- Street length--approximately 320 feet (depending on vehicle length)
- Street width--50 feet, plus width of the drums (obstacles)
- Distance between obstacles--58 feet, 6 inches (in-course) and 55 feet, 0 inches (end-of-course)
- Start/finish line--11 feet long, 3 - 6 inches wide
- See Range Diagram in Instructor Manual, Unit 1.8

Required material:

- Line marking material for delineating street boundaries as well as the start/finish line and stop lines
- Three obstacles required, these should be made from six 55-gallon oil drums (standing one one top of the other) and butt welded end to end to produce 3 high drums for better visibility)
- Four cones (marking ends of start/finish and stop lines)

Exercise setup:

- The painted lines or cones used to delineate the simulated street boundaries are placed parallel to each other, 25 feet away from the edge of the drums which have been placed in a straight line in the center of the street
- The first obstacle (55-gallon drum) is placed 75 feet from the starting line and the third obstacle is always placed 130 feet from the stop line. These 2 measurements shall remain constant at all times
- The distance between the drums is changed according to the length of the vehicle and/or according to the level of difficulty desired for the problem. Thus the distance between each drum is 58 feet, 6 inches (in-course) and 53 feet, 0 inches (end-of-course).

Exercise Instructions

- Position front of vehicle at the start/finish line facing exercise course.
- Begin maneuver when I (Adminstrator) give a hand signal or voice command.
- Move vehicle in a figure 8, (serpentine motion) forward around the obstacles going first to the right and then to the left of the drums. Don't stop or back up unless it's necessary.
- Stop vehicle when the front bumper reaches the stop line. Do not move vehicle again until told to do so.
- Shift into reverse and begin backing when I signal (hand or voice command).
- Starting on the opposite (left) side of the last obstacle, back the vehicle in the same type motion through the course.
- The maneuver ends when front bumper of the tractor clears the start line as you back out of the exercise.
- You should complete the maneuver as quickly as possible while keeping the vehicle under control, and without making any mistakes.

Scoring

Criteria (End-of-Course)

Forward

Motion Control

--Makes no directional changes or stops

Contact

--Completes exercise without touching or hitting drums

--Completes exercise without touching boundary delineators

Time

--Completes exercise in 45 seconds or less. (Timing begins when tractor crosses start line and ends when vehicle comes to a complete stop) with front bumper at stop line.

Reverse

Motion Control

--Makes no more than 2 direction changes or stops.

Contact

--Completes exercise without touching or hitting drums

--Completes exercise without touching boundary delineators

Time

--Completes exercise in 2 minutes 30 seconds (or less)

Criteria (In-course)

Forward

Scoring criteria same as End-of-Course except time limit is 60 seconds.

Reverse

Motion Control

--Makes no more than 4 changes or stops

Contact

--Completes exercise without touching or hitting drums

--Completes exercise without touching boundary delineators

Time

--Completes exercise in 4 minutes (or less)

Position of Examiner

Forward--Middle of the street, approximately 15 feet beyond the stop line (the end of the street).

Reverse--Middle of the street, approximately 15 feet behind the start/finish line.

PARALLEL PARKING - JACKKNIFED

Purpose--Assesses performance of the student to back the vehicle on an offset path and position the trailer in a confined space parallel to the curb with the tractor at a 90 degree angle to the trailer.

Exercise Layout

Layout dimensions:

- Street length--approximately 150 feet (depends on length of trailer)
- Street width--40 feet
- Parking space width--8 feet, 6 inches
- Parking space length--length of semi-trailer plus an additional 6 feet
- See Range Diagram in Instructor Manual, Unit 1.8

Required materials:

- Line marking material for delineating street boundaries
- Two barricades (construction of parking space)
- Curbing, minimum of 40 feet

Exercise setup:

- The lines or traffic cones used to delinate the street boundaries are placed parallel to each other 40 feet apart, extending for at least 200 feet.
- The length of the parking space will be the length of the semi-trailer, plus 6 feet, thus a 40 foot trailer would require a 46 foot long space
- At least 40 feet of simulated curbing (either painted lines or lumber may be used) must be placed on the line delineating the right side street boundary
- At forward end of parking space at least a 10 foot long gap between curbing end and the barricade to accommodate the rear wheels of the tractor as it backs into the fully jackknifed position
- At each end of the parking space a barricade must be placed perpendicular to the street boundary delineations, these barricades must extend outward into the street exactly 8 feet, 6 inches.

Exercise Instructions

- o Enter the street from the entrance line and while staying within the delineators, come to a stop with your vehicle in a proper position to back into this space (point) at the curb
- o After I (Administrator) give you a hand signal or voice command start backing in
- o Back trailer into parking space as close to the curb as possible and finish with the tractor in a jackknife position (tractor at 90° angle to trailer)
- o Blow horn to indicate that you are ready to be measured
- o Change direction and stop only as necessary
- o You should complete the maneuver as quickly as possible, while keeping vehicle under control, and without making mistakes

Scoring

Criteria (End-of-Course)

Motion Control

--Makes no more than 2 direction changes or stops

Contact

--Makes no street boundary touches

--Makes no barricade or curb touches or hits

--Make no curb crossings with trailer wheels

Distance

--Parks trailer parallel to and no more than 12 inches from curb throughout length of trailer.

Time

--Completes maneuver within 2 minutes and 30 seconds or less. (Timing begins when vehicle starts its backward movement and ends when it comes to a complete stop within the confines of the parking space and driver sounds horn to signal he/she is ready for measurement to be taken).

Criteria (In-course)

Motion Control

--Makes 4 or less direction changes or stops.

Contact

--Make no street boundary touches

--Makes no more than 2 barricade or curb touches or hits

--Makes no curb crossings with trailer wheels

Distance

--Parks trailer parallel to and no more than 24 inches from curb throughout length of trailer

Time

--Completes maneuver within 4 minutes or less

Position of Examiner

- Position is outside the street boundary next to the back barricade of parking space.
- As trailer is moved into space, examiner moves toward opposite end of space for a better view of the front barricade and curb.

CONTROLLED STOP LINE

Purpose--Assesses performance of the student in bringing the vehicle to a smooth stop at a designated point.

Exercise Layout

Layout dimensions:

- Vehicle start point--at least 100 feet from stop area
- Stop line--at least 11 feet long, 3 - 6 inches wide

NOTE: This test exercise can be incorporated into any of the other exercises. A stopline can be added to the Offset Alley exercise, approximately 25 feet past the last alley. The decision line in the Overhead clearance exercise can be utilized for the Controlled Stop also.

Required material:

- Line marking material to delineate stop line
- Three cones (or similar objects) to identify start point and stop line

Exercise setup:

- A single traffic cone is placed to indicate the starting point of the approach run.
- The material used for the stop line is placed on the exercise area (11 feet long, 3 - 6 inches wide)
- A cone is placed on each end of the stop line

Exercise Instructions

- Approach the starting point (i.e., single cone) moving at a speed of between 8 and 10 mph, maintaining a normal driving position.
- Only one brake application, you are to stop your vehicle as close with the tractor front bumper as possible to the stop line (without going over it).
- Your stop should be as smooth as possible, there should be no visible front end bounce or nose rebound, and no audible exhaust of air from the brake system.
- Make one stop only, do not allow vehicle to move after stopping.
- Hold that position until I (Administrator) have made measurement and tell you to move.

Scoring

Criteria (End-of-Course)

Distance

--Stops vehicle 6 inches (or less) from stop line without going over it.

--Does not touch or exceed stop line. (Measurement should be made from the near edge of stop line to closest point on the front bumper excluding boltheads, license plates, or license plate brackets).

Smoothness

--No audible sound of air release as vehicle stops.

--No visible front end bounce or nose rebound.

Criteria (In-course)

Distance

--Stops vehicle 18 inches (or less) from stop line without going over it.

Smoothness

--No more than slightly audible sound of air release as vehicle stops.

--No more than slightly visible front end bounce or nose rebound.

Position of Examiner

- Either to the left or right of the stop line.

OVERHEAD CLEARANCE

Purpose--Assesses the performance of students in judging space available above the vehicle to within 6 inches.

Exercise Layout

Layout dimensions:

- Start line--5 feet from overhead clearance obstacle (11 feet long, 3 - 6 inches wide).
- See Range Diagram in Instructor Manual, Unit 1.8

Required material:

- Line marking material for delineating start line.
- Two cones or similar type objects for marking start line.
- Two 16 foot stanchions with an adjustable height crossbar on pull ropes standard(s) for creating overhead clearance obstacle.
- Two students to man the pull ropes for height adjustment as called for by student driver.

Exercise setup:

- Start line is set 5 feet from overhead clearance obstacle.
- Select obstacle settings, anywhere from 1 to 6 inches below or above the trailer's actual height. Students are required to make a judgment on only one setting. Clearance is set at one of the settings as decided by a coin flip prior to the student's approaching the start line. (Adjustment should be made when student is not in a position to observe that the height has been changed).
- Cones are placed on either end of start line.

Exercise Instructions

- Position your vehicle at the start line facing the problem and open your cab door.
- When I (Adminstrator) give a hand signal or voice command you may begin moving.
- Looking out the door up over your RIGHT shoulder, drive forward, without stopping until, the front of your trailer is within 12 inches of the cross bar and stop.

- o Tell me (Administrator) whether the cross bar must be raised or lowered so that it will clear the top of the trailer by NOT MORE THAN 6 INCHES.

- o You (student) may request the cross bar to be raised or lowered as often as you wish, but remember there is a time limit involved.

- o Once the crossbar has been adjusted, move the vehicle forward but be prepared to stop again in case you have misjudged the clearance.

- o The maneuver ends when trailer passes under the obstacle or is forced to halt because the cross bar is too low.

- o You should complete maneuver as quickly as possible, while keeping the vehicle under control, and without making mistakes.

Scoring

Criteria (End-of-course)

Distance

--Student's judgement is either correct or incorrect, i.e., the trailer roof clears the cross bar by no more than 6 inches

Time

--Completes maneuver within 45 seconds (timing begins when vehicle stops within 12 inches of the cross bar and ends when student has selected cross bar height and starts forward again).

Criteria (In-course)

Distance

--Student's judgement is either correct or incorrect, i.e.,, the trailer roof clears the cross bar by no more than 6 inches.

Time

--Completes the maneuver within 90 seconds.

Position of Examiner

- o On left side of the vehicle, close enough to communicate with the student driver.

PRETRIP INSPECTION

Purpose--Assesses performance of the student in applying knowledge of vehicle inspection requirements.

Exercise Layout

- No specific layout required. However, the tractor-trailer should be modified to include at least five problems (simulated defects) for students to identify.

Exercise Instructions

- Begin pretrip inspection when I (Administrator) tell you.
- As you inspect the vehicle components, tell me what you are looking at (or for) and what the conditions or reading of the component is (e.g., engine belts--snug, not worn, Fuel tank--full, no dents or leaks, Ammeter--charging).
- The inspection will end when you tell me that you are finished.
- You should complete the exercise as quickly as possible, without making mistakes.

Scoring

Criteria (End-of-Course)

Approaching Vehicle (Step 1)

Components

--Inspects required number of items.[1]
--Answer is either yes or no (resulting in either a yes or no mark on scoresheet)

Time

--Timing begins in this category but will not be assessed until the last category has been completed (Air Brake System).

Under Hood (Step 2)

(Scoring criteria same as Approaching Vehicles)

---

1 The inspection has 7 basic "steps" which shall be performed in the above order, but sequence of components inspected within any of the 7 steps will not be a factor in the scoring. A yes/no score will be recorded for each category. For a list of required components, see "ITEMS TO BE INSPECTED DURING "PRETRIP".

Inside Cab (Step 3)

(Scoring criteria same as Approaching Vehicle)

Lights (Step 4)

(Scoring criteria same as Approaching Vehicle)

Walkaround Vehicle (Step 5)

(Scoring criteria same as Approaching Vehicle)

Signal Lights (Step 6)

(Scoring criteria same as Approaching Vehicle)

Air Brake System (Step 7)

Components

Inspects required number of components.

Time

--Completes inspection in 15 minutes or less.[1] (Timing ends when student says he is finished.)

Problems

--Identifies all of the vehicle problems requiring attention.
--Answer is either yes or no (mark scoresheet either yes or no)

Criteria (In-course)

Scoring criteria same as End-of-Course test except time limit is 30 minutes.

Position of Examiner

- Should follow student throughout inspection both in cab and out.

---

1 The time requirements listed take into consideration that the student must verbally identify each component checked, as well as explain what they are looking for.

ITEMS TO BE INSPECTED DURING PRETRIP

Items are grouped into seven categories:

I	Approaching Vehicle	V	Walkaround Inspection
II	Under Hood	VI	Signal Lights
III	Inside Cab	VII	Air Brake System
IV	Lights		

I. Approaching Vehicle

1. Note General Condition of both tractor and trailer
2. Leaks - (oil, coolant, grease, fuel)

II. Under Hood

1. Oil Level
2. Coolant Level
3. Power Steering Fluid and Lines*
4. Windshield Washer Fluid Level
5. Battery Fluid Level
6. Battery Connections and Tiedowns
7. Automatic Transmission Fluid*
8. Engine Oil Make-Up Reservoir
9. Belts
10. Leaks (Engine Fluids)
11. Wiring

III. Inside Cab

(Primary Controls)

1. Steering Wheel
2. Clutch
3. Accelerator
4. Foot Brake
5. Trailer Brake
6. Parking Brake
7. Limiting Valve
8. Tractor Protection Valve
9. Exhaust Brake*
10. Transmission Controls
11. Interaxle Differential
12. Power Take Off (Controls*)

(Secondary Controls)

1. Horns
2. Windshield Wiper/Washer
3. Light Switches (headlight, dimmer, body blinker, turn signal and 4-way flasher)
4. Climate Controls (heater, defroster, air conditioning)
5. Power Take Off
6. Fifth Wheel Air Slides*

(Other Items)

1. Mirror(s) drivers side
2. Windshield and door glass
3. Emergency Equipment

Inside Cab - Engine Running

(Instruments)

1. Oil Pressure
2. Ammeter/Voltmeter
3. Coolant Temperature
4. Engine Oil Temperature
5. Air Pressure
6. Warning Lights and Buzzers

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* If vehicle so equipped

IV. Lights

1. Headlights - High and Low Beam
2. Four-way Flashers
3. Mirror(s) Passenger Side

V. Walkaround Inspection

(Left Side of Cab Area)

1. Drivers Door
2. Left Front Wheel
3. Left Front Suspension
4. Left Front Brake*

(Front of Cab Area)

1. Front Axle
2. Steering System
3. License Plate(s)
4. Windshield & Windshield Wipers
5. Lights and Reflectors
6. Right Turn Signal

(Right Side of Cab Area)

1. Passenger Door
2. Cab Tilt Mechanism*

(Right Saddle Tank Area)

1. Right Fuel Tank(s)
2. Visible Parts of Rear of Engine, Transmission, Drive Shaft, Exhaust System, Frame, Air Lines and Electrical Wiring
3. Spare Tire

(Right Rear Tractor Wheels Area)

1. Dual Wheels
2. Tandem Axles
3. Suspension
4. Adjustable Axles*
5. Brakes

(Rear of Tractor Area)

1. Frame and Cross Members
2. Lights and Reflectors
3. Splash Guards
4. Air and Electrical Lines

(Trailer Frontal Area)

1. Air and Electrical Connections'
2. License/Registrations Holder
3. Header Board*
4. Canvas or Tarp Carrier*
5. Lights or Reflectors

(Coupling System Area)

1. Lower Fifth Wheel
2. Upper Fifth Wheel
3. Air and Electric lines
4. Sliding Fifth Wheel

(Right Side of Trailer Area)

1. Landing Gear
2. Spare Tire(s)
3. Lights and Reflectors
4. Cargo Securement*
5. Sideboards*
6. Curbside Doors Secured*
7. Overwidth Sign*
8. Frame and Cross Members

(Right Rear Trailer Wheels Area)

1. Dual Wheels
2. Tandem Axles
3. Sliding Axles*
4. Suspension
5. Brakes

(Rear of Trailer Area)

1. Lights and Reflectors
2. License Plate(s)
3. Splash Guards
4. Cargo Securement*
5. Overlength Signs*
6. Additional Lights/Flags*
7. Rear Door Secured
8. Required Seals in Place*

(Left Rear Trailer Wheel Area)

Same as Right Side

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* If vehicle so equipped

V. Walkaround Inspection (Continued)

(Left Side of Trailer Area)

Same as right side except for "Side Doors"* instead of "Curbside."

(Left Saddle Tank Area)

Same as right side, minus Spare Tire plus battery condition, securement and cover.

VI. Signal Lights

1. Stop Lights
2. Left Turn Signal Light

VII. Air Brake System

1. Test Service Brakes
2. Low Pressure Alarm and/or Light
3. Tractor Protection Valve
4. Air Pressure Build Up
5. Parking Brake
6. Independent Trailer (Trolley) Brake
7. Brake System Balance

NOTE: Not all test vehicles will be equipped with all the items under ITEMS TO BE INSPECTED, as denoted by the * . The examiner should pick out the items that the test vehicle being used is equipped with and those become the items the student will be required to inspect.

For full details on any of these items consult the Pretrip Inspection Checklist in Unit 1.3 of Instructor Manual.

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* If vehicle so equipped

COUPLING

Purpose--Assesses performance of the student in controlling the vehicle and applying procedures correctly in performing the task.

Exercise Layout

- o No specific layout required.
- o Tractor parked 10 feet away and at right angle to the trailer

Exercise Instructions

- o Begin coupling maneuver when I (Administrator) tell you.
- o You should complete the activity as quickly as possible, keeping vehicle under control and without making mistakes.

Scoring

Criteria (End-of-Course)

Pre-Couple

Motion Control

--Makes one (or less) direction changes and/or stops.[1]

Contact

--Tractor is backed slowly, so fifth wheel jaws just barely touch (not hit) pickup apron of trailer.

Chocks

--Chocks front and rear of left trailer wheels.

Air Hookup

--Connects air lines properly (lines not crossed)

Air Supply

--Supplies air to trailer, applies and releases trailer brakes to insure they are functioning correctly.

Trailer Brakes

--Applies trailer brakes.

---

[1] Fifth wheel needs to be in line with king pin if not, student must pull tractor forward and align it correctly.

Couple

Hookup

--Backs tractor slowly under trailer until fifth wheel engages kingpin.

Test Hookup

--Moves tractor gently forward to check hookup, then repeats it.

Inspects Coupling

--Visually checks hookup by crawling under trailer.

Post-Couple

Electrical Hookup

--Hooks up electrical cable between tractor and trailer.

Landing gears

--Raises the trailer supports fully and secures the crank handle.

Chocks

--Removes the wheel chocks and stores them away.

Time

--Completes pre-couple, couple and post-couple phases in 8 minutes (or less). Timing begins with backward motion of tractor towards the trailer and ends with the pulling (removal) of the wheel chocks.

Criteria (In-course)

Scoring criteria same as End-of-Course Performance test except makes 3 (or less) direction changes and/or stops and the time limit is 18 minutes.

Position of Examiner

- o Left side of tractor close enough to communicate with student.
- o As student starts backing, should move to the left front side of trailer, close enough to observe, but out of the way.

NOTE: For full details on any of these items consult the Coupling Procedures Checklist in Unit 1.7 of the Instructor Manual.

UNCOUPLING

Purpose--Assesses performance of the student in controlling the vehicle and applying procedures correctly in performing the task.

Exercise Layout

- No specific layout required.

Exercise Instructions

- Begin uncoupling maneuver when I (Administrator) tell you.
- You should complete the activity as quickly as possible, keeping vehicle under control, without making mistakes.

Scoring

Criteria (End-of-Course)

Secure Vehicle

Procedure

--Completes required number of steps.[1]

Time

--Timing begins with first step in uncoupling procedure and ends when the tractor pulls clear of the trailer.

Uncouple

Procedure

--Completes number of required steps.[1]

Time

--Completes maneuver in 5 minutes (or less). The time begins with the first step in securing the vehicle and ends when tractor completely clears trailer.

Criteria (In-course)

Scoring criteria the same as End-of-Course Performance test except time limit is 10 minutes.

Position of Examiner

- Left side of tractor close enough to communicate with student.

---

1 Order of performing steps is not a factor in the scoring. A yes/no score is recorded for each category on the scoresheet. For a list of required steps see "UNCOUPLING PROCEDURE".

UNCOUPLING PROCEDURE

Steps are grouped into two categories:

I Secure Vehicle

II Uncouple

Secure Vehicle

1. Position vehicle (tractor in alignment with the trailer)
2. Apply trailer brakes
3. Place tractor protection valve in "Emergency Position"
4. Apply tractor parking brake
5. Place transmission in low gear and shut down engine
6. Lowers the trailer supports fully

Uncouple

1. Disconnect and store the air lines and electrical cable
2. Release fifth wheel latch
3. Pull the tractor slowly forward until fifth wheel begins to clear trailer apron
4. Apply tractor parking brake
5. Place transmission in low gear and shut down engine
6. Inspect trailer supports
7. Pull tractor completely clear of trailer

NOTE: For full details on any of these items consult the Uncoupling Procedures Checklist in Unit 1.7 of the Instructor Manual.

SCORE SHEET - RANGE TEST IN/END COURSE

Exercise	Score		Exercise	Score	
BACKING - STRAIGHT LINE			**PRETRIP INSPECTION**		
1 Motion Control	YES	NO	30 Approaching Vehicle	YES	NO
2 Contact	YES	NO	31 Under Hood	YES	NO
3 Time	YES	NO	32 Inside Cab	YES	NO
			33 Lights	YES	NO
OFFSET ALLEY			34 Walkaround Vehicle	YES	NO
4 Motion Control	YES	NO	35 Signal Lights	YES	NO
5 Contact	YES	NO	36 Air Brake System	YES	NO
6 Time	YES	NO	37 Problems	YES	NO
			38 Time	YES	NO
ALLEY DOCK					
7 Motion Control	YES	NO			
8 Contact	YES	NO	**COUPLING**		
9 Distance	YES	NO	(Pre-Couple)		
10 Time	YES	NO	39 Motion Control	YES	NO
			40 Contact	YES	NO
ALLEY DOCK - JACKKNIFED			41 Chocks	YES	NO
11 Motion Control	YES	NO	42 Air Hookup	YES	NO
12 Contact	YES	NO	43 Air Supply	YES	NO
13 Distance	YES	NO	44 Trailer Brakes	YES	NO
14 Jackknife Posiiton	YES	NO	(Couple)		
15 Time	YES	NO	45 Hookup	YES	NO
			46 Test Hookup	YES	NO
SERPENTINE/FORWARD			47 Inspects Coupling	YES	NO
16 Motion Control	YES	NO	(Post Couple)		
17 Contact	YES	NO	48 Electrical Hookup	YES	NO
18 Time	YES	NO	49 Landing Gear	YES	NO
			50 Chocks	YES	NO
SERPENTINE/REVERSE			51 Time	YES	NO
19 Motion Control	YES	NO			
20 Contact	YES	NO	**UNCOUPLING**		
21 Time	YES	NO	(Pre-Uncoupling)		
			52 Positions Vehicle	YES	NO
PARALLEL PARKING - JACKKNIFED			53 Trailer Air Off	YES	NO
22 Motion Control	YES	NO	54 Secures Tractor	YES	NO
23 Contact	YES	NO	55 Lowers Landing Gear	YES	NO
24 Distance	YES	NO	56 Disconnect Lines	YES	NO
25 Time	YES	NO	57 Stores Lines	YES	NO
			58 Fifth Wheel Release	YES	NO
CONTROLLED STOP LINE			(Uncouple)		
26 Distance	YES	NO	59 Pulls Tractor Forward	YES	NO
27 Smoothness	YES	NO	60 Secures Tractor	YES	NO
			(Post-Uncouple)		
OVERHEAD CLEARANCE			61 Checks Landing Gear	YES	NO
28 Correct Decision	YES	NO	62 Pulls Tractor Clear	YES	NO
29 Time	YES	NO	63 Time	YES	NO

Total # Passed___Total # Failed)___

Percent Correct _____

Student _____ Examiner _____

An explanation of scoring is provided on the back.

SUMMARY OF CRITERIA RANGE TEST IN/END COURSE

BACKING - STRAIGHT LINE
Motion Control: No changes or stops
Contact: Does not touch lane boundaries
Time: 90 sec. in course; 60 sec. at end-of-course

OFFSET ALLEY
Motion Control: No changes or stops
Contact: 2 or less touches; 1 or no hits in course; no touches or hits at end-of-course
Time: 90 sec. in course; 45 sec. at end-of-course

ALLEY DOCK
Motion Control: 4 or less changes or stops in course; 2 or less at end-of-course
Contact: 2 or less boundary/barricade touches or hits in course; none allowed at end-of-course
Distance: Stops 24 in. or less from back of dock; 12. in or less at end-of-course
Time: 4 min. 30 sec. in course; 2 min. 30 sec. at end-of-course

ALLEY DOCK - JACKKNIFED
Motion Control: 4 or less changes or stops in course; 2 or less at end-of-course
Contact: 2 or less boundary/barricade touches in course; none allowed at end-of-course
Distance: Stops 30 in. or less from dock (no hit) in course; 18 in. or less (no hit) end-of-course
Jackknife Position: Leaves tractor 90 degrees to trailer
Time: 4 min. 30 sec. in course; 2 min. 45 sec. at end-of-course

SERPENTINE - FORWARD
Motion Control: No changes or stops
Contact: No touching or hitting drums or street boundary delineators
Time: 60 sec. in course; 45 sec. at end-of-course

SERPENTINE - REVERSE
Motion Control: 4 or less changes or stops in course; 2 or less at end-of-course
Contact: No touching or hitting drums or street boundary delineators
Time: 4 min. or less in course; 2 min. 30 sec. or less at end-of-course

PARALLEL PARKING - JACKKNIFED
Motion Control: 4 or less changes or stops in course; 2 or less changes or stops at end-of-course
Contact: 2 or less curb touches, no curb crosses or barricade hits in course; none at end-of-course
Distance: Trailer 24 in. or less from curb in course; 12 in. or less at end-of-course
Time: 4 min. in course, 2 min. 30 sec. at end-of course

CONTROLLED STOP LINE
Distance: Stops 18 in. or less from line in course; 6 in. or less at end-of-course
Smoothness: Minor nose rebound and audible air release allowed in course; none allowed at end-of-course

OVERHEAD CLEARANCE
Correct decision: Clears within 6 inches or less
Time: 90 sec. in course; 45 sec. at end-of-course

PRETRIP INSPECTION
Inspects required components in Items 30 thru 36 identifies all simulated defects
Time: 30 min. in course; 15 min. at end-of-course

COUPLING
(Pre-couple)
Motion Control: 3 or less changes or stops in course; 1 or less at end-of-course
Contact: Tractor backed slowly, 5th wheel jaws just touch (not hit) pickup apron
Chocks: Chocks front and back of left trailer wheels
Air Hookup: Lines not crossed
Air Supply: Supplies air to trailer
Trailer Brakes: Applies trailer brakes
(Couple)
Hookup: Backs slowly until 5th wheel engages king-pin
Test Hookup: Moves forward checking hookup (Twice)
Inspects Coupling: Visually checks by crawling under trailer
(Post Couple)
Electrical Hookup: Hooks up cable
Landing Gear: Raises landing gear fully, secures crank handle
Chocks: Removes trailer wheel chocks
Time: 18 min. in course; 8 min. at end-of-course

UNCOUPLING
(Pre-uncouple)
Positions vehicle
Shuts off trailer air supply
Secures tractor
Lowers landing gear proper distance
Disconnects and properly stores air and electrical lines
Releases fifth wheel latch
(Uncouple)
Pulls tractor forward only until 5th wheel is clear
Secures tractor with frame ends under tailer nose
(Post-Uncouple)
Checks trailer landing gear for stability
Pulls tractor clear from trailer
Time: 10 min. in course; 5 min. at end-of-course

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FINAL EXAMINATION TEST BATTERY
PART C - STREET DRIVING TEST

The Street Driving Test is designed to measure all of the student performances objectives that are specified in this curriculum. The test has been designed to measure the student's ability to safely and cost efficiently operate a (loaded) tractor-trailer in a widely varied onstreet environment. It is administered twice over the same route, by two different test administrators. The test takes approximately 2 hours to complete however, the amount of time and/or minimum mileage requirements will vary considerably depending upon the geographic location of the school. This is due to the fact that some schools will have to travel further than other in order to include all of the required test situations in their Street Driving Test route.

The student performances measured include (but are not limited to) the following:

- Accelerating
  - --level ground
  - --inclines
- Braking
  - --controlled (normal stop)
  - --rapid
  - --downgrade
- Shifting
  - --up
  - --down
  - --ascending grades
  - --gear selection
- Lane Keeping
  - --straight
  - --curves
  - --turns
- Position
  - --upgrades
  - --lane selection
  - --tight turns
  - --wide turns
  - --dual turns
  - --merge
  - --lane change
  - --restrictions
- Distance
  - --adjacent vehicles
  - --following
  - --gap selection
  - --overhead clearance
- Adjusting Velocity
  - --curves
  - --turns
  - --merge
  - --signaling
  - --obstructions
  - --posted speed
- Communicating
  - --turns
  - --lane changes
  - --merges
  - --following vehicle
  - --headlights
- Observing
  - --sides
  - --adjacent vehicles
  - --following vehicles
  - --merge
  - --lane changes
  - --turns
  - --high beams

Certain instruments are required on the test vehicle to insure maximum objectivity of the test and scoring criteria has been reduced to the most simple format possible to aid in maintaining test reliability.

The final specifications for routes, vehicle instrumentation, scoring forms, and scoring criteria will be finalized during curriculum validation. The material will then be added to this section of the manual, the Instructor Manual and to the BMCS Proposed Minimum Training Standards for Training Tractor-Trailer Drivers.

GRADUATION

Students who successfully complete all course requirements are eligible for graduation. As a part of the graduation process, schools may provide assistance to students in meeting licensing requirements imposed by the State.

GRADUATION REQUIREMENTS

Eligibility to graduate should be based upon two factors:

- Performance in course work.
- Graduation tests. (The 3 Part Final Examination Test Battery).

Performance in Course Work

In order to graduate, students must perform satisfactorily all aspects of course work. Daily reports of student performance should be kept on a Student Master Record Form as described under Evaluating and Recording student performance in this manual. The records should show that a student has achieved all of the objectives for the course before the student may be considered eligible for graduation.

The satisfactory completion of all course work also means that each student will have a minimum of both 38.5 hours BTW time and to have driven a cumulative 1,000 miles of street instruction is based upon a 3 to 1 student/instructor ratio.

Graduation Tests

Students who have satisfactorily completed course work requirements, and whose Student Master Record shows attainment of all course objectives, may be allowed to take the graduation tests. As specified in the BMCS Training Standards, there is a required Final Examination Test Battery which is made up of 3 parts:

- Part A - Written knowledge Test -- A written test of knowledge encompassing all course objectives.
- Part B - Driving Range Test -- A test of vehicle handling ability conducted on an off-street range, using standard "roadeo-type" maneuvers.
- Part C - Street Driving Test --A road test with a loaded tractor-trailer conducted in traffic.

Only students achieving passing scores on each of the tests are eligible for graduation. Students failing one or more tests should be provided remedial instruction and then retested. Those who still fail to pass, shall not be issued a graduation certificate.

CERTIFICATION

Under the BMCS Training Standards, drivers graduating from this Curriculum must have a certificate showing evidence of achievement of the instructional objectives set forth in the BMCS Training Standards. Refer to those standards for complete details.

To aid students in obtaining employment with a motor carrier, schools must issue a completed Training Certificate to all students who have fulfilled the requirements for graduation. Any student attaining the objectives of the Curriculum, and who passes the Final Examination Test Battery is eligible for a Training Certificate.

LICENSING EXAMINATION

While the issuance of a license to operate a tractor-trailer is outside of the scope of training, schools should try to assist students through certification, preparation for the licensing test, school-administered testing and use of school equipment.

School Certification

In some States, drivers who are certified as proficient by a recognized/certified school or motor carrier are not required to take the road test portion of the State license examination. In certifying a graduate for licensing, the school is accepting a responsibility toward the graduate and toward the general public to assure that qualifications have been objectively and thoroughly assessed.

Preparation

Schools should provide all legitimate forms of assistance available to students in helping them to prepare for the state license test. Such assistance includes the following:

Information on State Requirements--Students should be fully informed as to the nature of licensing requirements. This can be done by incorporating into the course any information that the state makes available concerning the test, including any manual that the state provides for licensing of tractor-trailer operators.

Pre-testing--In some schools, the final street test is administered by someone other than an instructor. This not only enhances the objectivity of the test but gives students the experience of taking a test administered by someone with whom they are not acquainted.

Route Familiarization--There is nothing wrong with allowing students to practice operating over the test route employed by license examiners so long as students are given no more information concerning the test to be given than would be available to

the general public. Providing an opportunity to drive over the test routes allows students to concentrate more on safe operating practices and less upon destination-finding than would be possible if they were unfamiliar with the route.

School Administered Tests

Some states permit examiners to come to the school and administer the tests to students in a group in order to reduce the manpower and burden upon license facilities from that which would be required for individual test administration. Where a written test must be taken to obtain a learner's permit, having the test administered at the school is less disruptive of the school schedule than having to give students time to go to the licensing station. Where school-administered tests are permitted, it is of benefit to the school, the student, and the licensing station to make the necessary arrangements.

Equipment

In order to take a road test, students must have a vehicle available. Most states will also require a licensed operator to drive the vehicle to the licensing station and, if the student fails the exam, drive it back. Providing a vehicle and a licensed operator (e.g., assistant instructor) is a service the school should be expected to provide.

PLACEMENT

The manner in which schools place students in jobs, like the manner in which they recruit students in the first place, is not materially affected by the Curriculum. However, enabling students to acquire the abilities that are sought by the Curriculum will benefit neither the students nor the employers unless an effort is made to bring the two parties together. This can only be done through an effective placement system. Such a system involves at least three components:

- o Student counseling.
- o Truck fleet (motor carrier) relations.
- o Employment records.

STUDENT COUNSELING

A portion of the curriculum is devoted to providing students assistance in seeking suitable employment (Unit 5.7). However, this instruction can only address the collective needs of students. A counseling program is needed to help individual students take account of their strengths and weaknesses in seeking employment. Such counseling should deal with the student's employability and the employment opportunities that are available.

Employability

Students should be given an objective appraisal of their own employability before they spend time seeking positions. Such an appraisal will; (1) help guide them to suitable employers, helping them to avoid wasting time talking to employers about jobs for which they do not qualify; (2) help them to recognize what positions, conditions, and salary are appropriate to their situation, and (3) enable them to present themselves in the best possible light. The discussion of employability should focus upon such key factors as the student's age, ability, and personal characteristics.

Age

The relationship of age to job prospects was covered in the Student Selection section of this manual, where administrators were urged not to admit students whose age limited their employability without at least apprising them of that fact. Graduates under the age of 25 should be steered toward those employers known to have positions for which young, inexperienced drivers can qualify, (e.g., as assistant to drivers, yardmen, etc.). They need also to be counseled on how they may use their time in non-driving positions effectively to at least maintain and, if possible, build on the skills they acquired in school.

Ability

All graduates must have demonstrated the ability needed to operate a tractor-trailer safely. However, students meeting this requirement will vary considerably in the specific strengths and weaknesses they can bring to the job. Abilities having the biggest impact upon placement:

Strength--Students who are lacking in physical strength, including women, should be discouraged from seeking jobs involving heavy cargo handling tasks.

Mental Ability--Students with limited verbal and numerical ability should be steered away from positions that will require any more than the minimal amount of paperwork. Conversely, students who excel in these areas should be steered toward companies having career ladders that will allow promising drivers to rise to supervisory and management positions.

Personal Characteristics

While the effect of personal characteristics upon the ability to obtain employment will have been discussed in Unit 5.7, students need to be advised of any individual characterstics of their own that may stand in the way of employment. People are often unable to recognize how the general guidance they receive applies to their own situation. Students should be given a frank appraisal of how well they stack up relative to:

Appearance--Students who are unclean or sloppy may not be aware of how noticeable it is and need to have it pointed out to them. They also need to know that certain characteristics that are admired by their peers may not be appreciated by prospective employers, e.g., beards and long hair.

Dress--What students wear in school does not always predict what they will wear to a job interview. However, their attire should be discussed and students warned against eccentric garb that may attract too much unfavorable attention.

Attitude--Students whose interactions with the teachers and the school administration evidence difficulty in relating to others, particularly people in authority, should be advised that they have a potential problem. Many students do not see themselves as others do; a student who believes he is exhibiting "confidence" may not realize that it appears more like arrogance.

Mannerisms--Any mannerisms that might be offensive to prospective employers should be brought to the student's attention. While students may not appreciate having them pointed out, it is a disservice not to do so.

Expectations--Students should be queried as to their expectations. While this subject is treated in Unit 5.7, many students are misled by relatives, friends, and other students.

Employment Opportunities

So that efforts to seek employment are most efficiently directed, students should be guided to those organizations whose needs are most likely to match these students' qualifications. Specific factors to be addressed include age, specific employer characteristics, and preparation for interviews.

Age

In the discussion of the relation between age and employability suggested in the previous section, students should be guided toward employers who are most likely to employ drivers in their age range. They should also be advised of the specific jobs to seek.

Employer Characteristics

The characteristics of various employers should be discussed to help students match their needs and characteristics with those of employers. Specific issues to be addressed include the following:

whether or not the employer is hiring at present

company turnover and the average length of employment

long-term career potential

prevailing salaries

types of routes operated (local vs long-distance)

areas of the country and States served

Preparation for Interviews

In Unit 5.7 students will have an opportunity to practice interviews. During the counseling session, the more practical aspects of interviews to be handled are

helping students to arrange interviews

assisting students in preparing application forms

furnishing the students with records to take with them

giving guidance in preparing application forms

Fleet (Motor Carrier) Relations

The ability of a school to place its students depends greatly upon the type of relationship it maintains with various trucking company officials in their area. Nurturing a good relationship with fleets involves providing access to records, arranging site visits, and scheduling on-site interviews.

Access to Records

Schools can earn the confidence of employers by providing access to complete records of student attendance and achievement. Records that may be furnished include the following:

> Student Master Record--A record of student attainment containing daily records of progress, results of in-course and graduation tests, and instructor comments (see the sample Student Master Record Form in "Evaluating and Recording Student Performance."
>
> Background Information--Background information gathered during the selection process, a copy of the student application, and a student resume.
>
> Outside Records--Any records obtained by the school prior to or during admission, e.g., driver record, certificate of physical examination.

Records should be provided quickly. If they take a long time in reaching the employer, somebody else may already be hired for the job.

On-Site Visits

Employers tend to be skeptical as to the effectiveness of truck driver training school training. This skepticism may result from never having visited a school or having visited the wrong ones. In either case, having an opportunity to visit and observe a school that has a sound program and qualified instructors will certainly enhance the image of the school and its chances of placing its graduates.

Employer representatives should be invited to drop in unannounced so that they can be confident they are seeing the real program and not a show. They should also be invited to ask questions of instructors and students.

On-Site Interviews

While most employers will expect applicants to come to them, some may be interested in interviewing prospective students on site. On-site interviews will permit company representatives to (1) talk with instructors and administrators about individual students, (2) review complete student records, and (3) check the student out during a school vehicle.

On-site interviews could be scheduled for individual employers or, if the demand becomes too great, scheduled for an "Employer Day" during the final week of each course.

Employment Records

Schools cannot be expected to keep track of their former students, particularly in view of the relatively high mobility of tractor-trailer drivers. However, student records should, if possible, record the first job obtained by former students. Such an employment record would allow schools to:

identify type of employers and specific employers that represent the best placement prospects for students

determine and document its placement rate.

abandon To give up. For example, when consignee or shipper relinquishes or gives up damaged freight to carrier.

A.C. generator An electrical generator that generates voltage and current by rotating a magnetic field across stationary conductors. Also called alternator, it produces alternating current and uses diodes to change the alternating current to direct current. See **D.C. generator.**

accelerate To increase speed.

accelerator pedal Depresses accelerator to increase engine speed.

acceptance Receipt by the consignee of a shipment. This termi - nates the common carrier contract for transportation.

accessorial service A service rendered by a carrier in addition to a transportation service, such as stopping in transit to complete loading or to partially unload. Also heating, storage, etc.

adapter, electrical A device that allows a connection to be made between two items of equipment having different types of connectors Most often used to connect electrical lines, particularly a connection between the tractor and trailer, when one electrical line has four prongs and the other six prongs.

adjustable axles See **sliding tandem.**

agency Used interchangeably with call station but generally an agent picks up and delivers freight for an intercity carrier while a call station handles orders from shippers but performs no freight handling functions. See **call station.**

agent A person authorized to transact business for and in the name of another. A driver becomes an agent of the trucking company when signing for freight.

aggregated shipments Several shipments from different shipper to one consignee that are consolidated and treated as a single consignment.

agitator body Truck body designed and equipped to mix concrete in transit.

agreed valuation Freight value mutually agreed upon by shipper and carrier as a basis for transportation charges. It also may represent an agreed maximum amount that can be recovered in case loss or damage.

agreed weight A weight set and agreed upon by carrier and shipper as a basis for charges.

air brakes Brakes that utilize compressed air instead of fluid.

air cleaner Device for cleaning and purifying air entering engine. Also called **air filter**. There may be two, a primary a secondary.

air compressor Device to build up and maintain required air pressure in the brake system reservoir.

air filter Same as **air cleaner**.

air filter restriction gauge Registers the flow of air through the air filter element. Provides indication of filter's obstruction by dirt and other materials which would restrict the flow of air to the engine.

air hose See **air lines**.

air intake distributing manifold Distributes air to the various cylinders of the engine and attaches to the cylinder heads at the intake ports.

air-lift axle An axle with an elevating device operated by air that enables the driver to regulate the amount of weight carried on that axle by raising or lowering it.

air lines Used to carry compressed air from one part of the air brake system to another and from tractor to the trailer. One line is called the **emergency** or **supply** line and is always charged with compressed air. The other line is called the **service** or **control** line. When the air brake treadle valve is depressed, air flows from the supply resevoir through the **service** line and causes the brakes to apply.

air-over-hydraulic brakes Brakes on a vehicle that have a regular hydraulic system assisted by air pressure.

air pressure gauge Measures pressure of air in air tanks in psi. If the pressure drops below 60 psi, a low pressure warning device (buzzer or light) will operate, indicating unsafe vehicle. Sometimes there are two. The second gauge indicates pressure used during braking.

air reservoir Storage tank for compressed air.

air reservoir (trailer) Storage tank for compressed air for the trailer brakes.

air slider A cab-controlled sliding fifth wheel that can be unlocked by air to be moved backward or forward. See **sliding fifth wheel.**

air tag A tag axle that has two bellows-like air bags that, when filled, force the tractor's rear axle harder against the ground for a smoother ride and for weight distribution between the two axles of the tractor.

allowance (1) A sum granted as a reimbursement or repayment. (2) A deduction from the gross weight or value of goods.

alternating current Electrical current that changes its direction of flow many times a second and is used in a building, as opposed to **direct current** as used on a vehicle.

American Trucking Associations, Inc. (ATA) A national federation of independent and automomous state trucking associations, each representing all classes and types of truck operation, and thirteen independent and automomous conferences, each of which represents a special class or type of truck operation. Headquarters location 1616 P Street, N.W., Washington, DC 20036.

ammeter An instrument that measures the amount of current flowing in an electrical current.

ampere Unit of measurement of flow of electrical current.

application pressure air gauge Gauge that indicates pressure being applied by brakes during brake operation. See **air pressure gauge.**

A.P.U. Authorized pickup.

arrival notice A notice, furnished to consignee, of the arrival of freight.

articulated Having parts connected by joints. A tractor-trailer is an articulated vehicle.

assign The transfer of property to another, frequently for the benefit of creditors.

assignee One to whom a right or property is transferred.

assignor One by whom a right or property is transferred to another.

astray freight Freight bearing marks indicating origin and destination, but separated from the waybill. See **over freight.**

automobile transporter body Truck or trailer body designed for the transportation of vehicles.

auxiliary transmission A second transmission connected with the main transmission to provide a wider range of speeds and gear ratios.

axle The bar that connects opposite wheels. There are two types of axles: live axles, which transmit power from the drive shaft to the wheels, and dead axles, which do not transmit power and are used only to help carry the load or to steer.

axle ratio Ratio of axle to drive line; the number of turns of the drive line in relation to one full turn of the drive wheels. The higher the numerical ratio, the slower the road speed. See **gear ratio.**

axle temperature gauges Indicate temperature of lubricant in drive axles.

axle weight The amount of a rig's gross weight that rest on any one axle.

back haul (1) The return part of the trip; (2) the freight that is carried on the return portion of a trip; (3) a shipment that is carried back over part of a route that has been previously traveled.

balloon freight Light, bulky cargo.

band ply The first ply on the inside of a tire.

base state The state in which a vehicle is primarily registered.

battery An electrochemical device for storing and supplying electrical energy.

BBC The length of the tractor from the bumper to the back of the cab. Always stated in inches.

bead The inner edge of the outer wall of a rubber tire, fitting on the rim. The "foundation" of a tire. It is made of high tensile steel wires and wrapped and reinforced by the plies.

bead-to-bead measurement The distance from the heel of one bead straight up at 90° to the bead over the crown and down the other side to a position on the heel of the other bead directly opposite the starting point.

belt drive axle An axle driven by V-belts, which transmit power from the drive axle. See **V-belt drive.**

berm The shoulder of the road.

bill of lading (B/L) The written transportation contract between shipper and carrier (or their agents). It identifies the freight, who is to receive it and the place of delivery and gives the terms of the agreement. All goods going to a receiver at one destination in a single shipment or on one truck must be on a single bill of lading.

The straight bill of lading provides that freight be delivered to the receiver shown on the bill. It is non-negotiable. Surrender of this type of bill of lading is not required except when it is necessary for the receiver to identify himself. This might be necessary, for example, for certain bonded goods such as liquor. Always printed on white paper.

The order bill of lading is negotiable. Its purpose is to enable a shipper to collect for the shipment before it reaches its destination. The shipper sends an original bill of lading and a draft for the charges through a bank. The receiver pays the carrier's agent the amount of the draft and then can receive the goods. With this method, the shipper customarily consigns the shipment to himself. The person or company to be notified at destination is specified. The shipment may be released to the receiver only upon the order of the shipper. The order bill of lading must be surrendered with delivery of the freight. Always printed on yellow paper.

Either straight or order bills of lading may be designated as "through." A through bill of lading covers shipment by more than one transportation company at a fixed rate for the entire service. More than one type of transportation company (such as truck and rail) may be utilized. Also see **clean bill of lading.**

bill of sale A contract for the sale of goods.

billed weight The weight shown in a freight bill.

bingo card (Slang) See **cab card.**

birdyback Transportation of highway freight containers on aircraft.

blanket waybill A waybill covering two or more consignments of freight.

blasting agents See **HAZARDOUS MATERIALS.**

bleed the air tanks To drain the accumulated water out of the air tanks of a tractor to prevent the condensed water from reducing air tank capacity and thus cutting braking efficiency.

bleed the fuel lines To remove trapped air from the fuel lines.

blind side Right side of the truck and trailer, opposite of the **sight side.**

blocking Supports used to prevent cargo from shifting during transportation.

blower (1) A device that forces additional air into the engine to increase its efficiency and horsepower. Two types of blowers are the supercharger and the turbocharger; (2) fan that blows air over ice to maintain a low temperature in a trailer transporting perishable goods.

blow-off valve A regulatory valve on the air system that allows the escape of excess air pressure if the governor on the air compressor fails to operate.

blue label See **HAZARDOUS MATERIALS.**

B.M.C.S. See **BUREAU OF MOTOR CARRIER SAFETY.**

bobtail A tractor without a trailer; or a straight truck.

bogey Usually an axle added to tractor to carry more weight as for weight distribution. See **bogies.**

bogies An assembly of two or more axles, such as a tandem axle. See **tandem axle.**

bonded warehouse A warehouse approved by the U.S. Treasury Department and under bond or guarantee for the strict observance of the revenue laws. Also utilized for storing goods until duties are paid or otherwise released.

bonnet The protective covering over the air intake that keeps water or other substances from entering the air system; or the hood on any conventional type tractor.

boomers (Slang) See chain binders.

boom it down (Slang) Tighten chains around freight.

bore The diameter of a cylinder.

bottlers body Truck body designed for hauling cased, bottled beverages.

bottom dump Trailer body designed to dump its cargo through gates in bottom or floor of the trailer.

brake drum The rotating unit of the brake that is attached to the wheel.

brake horsepower The actual horsepower of an engine, measured by a brake attached to the drive shaft and recorded on a dynamometer.

brake lining A material designed to create friction that is attached to the brake shoe.

brake shoe The nonrotating unit of the brake (to which the brake shoe is attached) that contacts the rotating unit to supply braking force.

braking distance See **total stopping distance.**

break bulk To separate a composite load into individual shipments and route them to different destinations.

break bulk point or terminal A place where a composite load is separated into individual shipments and routed to different destinations.

break the unit (Slang) Uncouple the tractor from the trailer.

bridge The distance between one axle and another, or between two sets of axles. Used in some states to ascertain the permissible gross weight for the vehicle. Also called **spread.** See **spread tandem.**

B-trains A combination consisting of a tractor and two semi-trailers, the second trailer coupled to the first trailer by use of a fifth wheel, which is mounted directly behind the cargo body on the lead semi-trailer.

bulk freight Freight not in packages or containers.

bulkhead A metal or wooden device located on the back of the tractor or on the front of the trailer to keep loads from sliding forward and going through cab of tractor. Sometimes called a **header board.**

burdened vehicle In any situation, the vehicle which is required by law to yield right-of-way to another, "privileged" vehicle. See **privileged vehicle.**

Bureau of Motor Carrier Safety (BMCS) A part of the Federal Highway Administration, which is one of several administrations within the U.S. Department of Transportation that issues the Motor Carrier Safety Regulations (FMCSRs).

bushing A cylindrical metal sleeve inserted into a machine part for reducing the effect of friction on moving parts or for decreasing the diameter of a hole.

buttress The area on a tire between the edge of the tread and the sidewall.

cab-alongside-engine A tractor in which the cab is located alongside the engine (abbreviated CAE). Same as **cab-beside-engine.**

cab-behind-engine A tractor on which the cab is located behind the engine; a **conventional cab.**

cab-beside-engine Same as **cab-alongside-engine** (abbreviated CBE).

cab card Uniform Identification Cab Card in which the various State operating authorities and permit stamps are affixed. Called **bingo card** by drivers.

cab, conventional A tractor on which the cab is behind the engine. Also see **snub-nose.**

cab-over-engine A tractor on which the cab is located over the engine (abbreviated COE).

call station A person or company that agrees to transact business for a trucking company in a given location, generally a location where terminal facilities are not justified. Call station handles calls from shippers but usually performs no freight handling function. See **agency.**

camber Outward (or inward) tilt of wheels from true vertical.

camel back body Truck body with floor curving downward at the rear.

carbon monoxide (CO) A colorless, odorless, highly poisonous gas, produced by the incomplete combustion of fuel. It is usually expelled by the exhaust system.

carburetor That part of the gas engine fuel system where gasoline and air are mixed in controlled proportions.

cargo The freight carried by a vehicle.

cargo manifest See **manifest.**

carrier See **motor carrier.**

carrier's lien Right of a motor carrier to retain property which it has transported as security for the collection of freight charges.

cartage The charge made for hauling freight.

cartage allowance See **allowance.**

casing The tire structure, excepting tread and sidewall rubber.

cast wheel A casting that includes the hub and spokes at the end of which are studs, clamps and nuts that are used to support the rim.

caster Forward (or rearward) inclination of kingpin or support arm of wheel; amount of tilt in axle beam.

center of gravity The point within the length and width of a vehicle around which its weight is evenly distributed or balanced.

centrifugal force The force tending to pull a thing outward it is rotating rapidly around a center or rapidly rounding a curve.

certificate of weight An authoritative statement of the weight of a shipment prepared by a weighmaster.

Certificate of Public Convenience and Necessity Authority or certificate granted by the Interstate Commerce Commission to common carriers by railroad, motor vehicle, and water to operate in interstate commerce.

cetane number Rating applied to ignition properties of diesel fuel; the higher the number, the better the ignition quality. See **octane number**.

chain binders A device used to remove slack from chains used to tie down loads.

charge it (Slang) Allow compressed air to flow into semi-trailer lines.

charges (payment of transportation charges) Ordinarily, unless specific arrangements have been made, no carrier is permitted to deliver or relinquish possession at destination of any freight transported by it until all tariff rates and charges thereon have been paid. Carriers upon taking precaution deemed to be sufficient to assure payment of tariff charges may relinquish possession of freight in advance of payment of tariff charges and may extend credit in the amount of such charges for a period of seven days.

chasing Steering a tractor while backing so as to cause the tractor to follow (i.e., "chase") along the path of the trailer. Combines with "jacking" to allow the trailer to be maneuvered along the prescribed path. See **jacking**.

chassis The part of a motor vehicle that includes the frame, suspension system, wheels, steering mechanism, etc., but not the body and engine.

check valve Device to automatically isolate one part of air brake system from another. A one-way check valve provides free air flow in one direction only. A two-way check valve permits actuation of the brake system by either of two brake application valves

circuit breaker A device that automatically interrupts the flow of an electric current when the current becomes excessive.

circuit (electrical) A path through which electrical current can flow. A closed circuit provides a continuous, unbroken path from a current source through various current consuming devices back to the source (or a common ground). An open circuit occurs when the current path is interrupted or broken either by an open switch or

relay or by a broken wire or loose connection. A short circuit occurs when a damaged or loose wire accidently touches another damaged wire or some other conductive material. Current then takes a "short cut" to ground, bypassing part of its normal path. See **grounded circuit.**

circuitous route An indirect route.

claim (1) A demand for payment to compensate for freight damage that is supposed to have occurred while the cargo was in the hands of the carrier; (2) A demand for refund of an overcharge. See **overcharge.**

claim agent An employee who adjusts or settles claims made against his company.

claim tracer A request for information concerning the status of a claim.

claimant Person or company filing a claim.

classification (freight) A publication containing a list of articles and the classes to which they are assigned for the purpose of applying class rates together with governing rules and regulations.

classification rating The class to which an article of freight is assigned for the purpose of applying class rates.

Class I Motor Carriers Carriers having average gross operating revenues (including interstate and intrastate) of $5 million or more per year.

Class II Motor Carriers Carriers having average gross operating revenues (including interstate and intrastate) between $1 to $5 million per year.

Class III Motor Carriers Carriers having average annual gross operating revenues (including interstate and intrastate) of less than $1 million per year.

clean bill of lading A bill of lading signed by the carrier for receipt of merchandise in good condition (no damage, loss, etc., apparent), and which does not bear such notation as "shipper's load and count."

clean bore tank A single tank without compartments inside.

clear record A record which shows that a shipment was handled without loss or damage.

clearance lights The small lights that outline a vehicle's length and breadth. The lamps at the front and sides are amber; those visible from the rear are red. Also called marker or running lights. Also see **identification lights.** Required by the F.M.C.S.R. on vehicles 80 inches or more in width.

clearing house An organization set up to process and collect bills for participating trucking companies.

cleat A strip of wood or metal used for additional strength; to prevent warping; or to hold something in position.

clutch The part of the power train that allows the driver to connect the engine to the wheels.

C.O.D. See **collect shipment.**

collect shipment A shipment where collection of freight charges and advances are made by the delivering carrier upon delivery. Abbreviated as COD and commonly called COD by truckers.

combination rate A freight rate made through rates by combining two or more rates published in different tariffs.

combination through rate A through rate made by combining two or more rates published in different tariffs.

combination vehicle A truck or truck-tractor coupled to one or more trailers, also referred to as a "rig." See **rig.**

combustible Able to catch fire and burn easily.

combustible liquids See **HAZARDOUS MATERIALS.**

combustion Burning.

commodity Any article of commerce. Goods shipped.

commodity, exempt One that may be transported in interstate commerce without operating authority or published rates.

common carrier A transportation business that offers service to the general public. Interstate common carriers must hold a franchise issued by the Interstate Commerce Commission. This franchise limits service to a specific geographical area. Rates also are regulated. Routes and schedules of regular common carriers are regulated by government agencies, but irregular route common carriers may set their own without regulatory approval. Most states also regulate common carriers.

compression ratio Volume of air above the piston at bottom dead center compared with volume of air at top dead center.

compression stroke A phase of the four-stroke cycle when the air-fuel mix is compressed.

compressor See **air compressor.**

concealed damage A damage to the contents of a package which is apparently in good condition externally.

concealed loss Loss or damage that cannot be determined until the package is opened.

condenser An element usually found in the distributor (in gasoline engine ignition systems) that stores electricity for a short period of time.

connecting carrier Motor carriers which interchange trailers with another for completion of shipments.

connecting rod Rod that connects the piston to the crankshaft.

consign To send or address goods to another.

consignee One to whom something is shipped.

consignee marks A symbol placed on packages for export, consisting of such things as a square, triangle, diamond circle, cross, etc. with designed letters and/or numbers for the purpose of identification.

consignment A shipment.

consignor The person by whom articles are shipped (also known as the shipper).

container Anything in which articles are packed.

container (van body type) A truck or trailer body provided with means for ready removal from and attachment to a vehicle.

containerization Shipping system based upon large cargo-carrying containers that easily can be interchanged between trucks, trains and ships without rehandling the contents.

continuous seal A term denoting that the seals on a truck remained intact during the movement of the truck from origin to destination; or, if broken in transit, that it was done by proper authority and without opportunity for loss to occur before new seals were applied.

contraband Illegal or prohibited traffic or freight.

contract carrier A company that engages in for-hire transportation of property under individual contract or agreement with one or a limited number of shippers.

control (air line) See **air lines.**

converter gear or dolly The coupling device composed of one or two axles and a fifth wheel by which a semi-trailer can be coupled the rear of a tractor-trailer combination, forming a double-bottom

convertible A truck or trailer that can be used either as a flat-bed or open top by means of removable side panels.

convex mirror A type of mirror having a convex shape in order to show a larger field of view than can be obtained from a flat mirror of the same size.

cords, tire Strands forming the plies in a tire.

core On a radiator, a tubular fin structure acting as a heat exchanger for engine cooling fluids.

corrosive material See **HAZARDOUS MATERIALS.**

cowl Metal structure supporting dash and windshield.

crankshaft A shaft within the engine having one or more cranks for transmitting motion; the connecting rods transmit motion between the pistons and the crankshaft.

creeper gear (Slang) Lowest gear or combination of gears used for extra power.

cubic capacity The carrying capacity of a truck measured in cubic feet.

cubic foot A common measure of the capacity of a truck, 1,728 cubic inches.

curb weight The weight of an empty tractor-trailer minus driver and cargo but including fuel, oil, and all standard equipment.

current regulator A device that controls the amperage output of a generator.

custom house The government office where duties, tolls, import, or export taxes are paid.

cutout relay A magnetic switch used to open and close the electric circuit between the battery and the generator.

cylinder A chamber in the engine block that contains a piston.

Dangerous Articles See definitions under **HAZARDOUS MATERIALS.**

Dangerous Goods See definitions under **HAZARDOUS MATERIALS.**

D.C. Generator An electrical generator that generates voltage by rotating a conductor across a stationary magnetic field. Producing alternating current like an A.C. Generator, the D.C. Generator uses a mechanical device called a commutator, to convert the alternating current to direct current. See **A.C. generator.**

dead axle An unpowered axle used to increase the legal weight capacity of a vehicle.

dead-heading Running empty, without cargo.

defensive driving Driving in a way that avoids conflicts that may be caused by the mistakes of others while making no mistakes yourself.

delivering carrier The transportation company that delivers a shipment.

delivery The act of transferring possession of a shipment. This could be from consignor to carrier, one carrier to another or carrier to consignee.

demurrage Detention of a freight vehicle or container beyond a stipulated time. Also the payment made for such delay.

density The weight of an article per cubic foot. The ratio of mass to bulk or volume.

Department of Transportation (DOT) The federal agency responsible for the administration of the Federal Motor Carrier Safety Regulations. See **Bureau of Motor Carrier Safety.**

depth perception The ability to judge distances.

destination The place to which a shipment is to be delivered.

detention See **demurrage.**

diesel engine An internal combustion engine that uses compression to raise air temperature to the igniting point, whereas fuel is ignited by a spark in a gasoline engine.

differential The part of the power train that permits one wheel to turn at a different rate of speed from the other, as occurs when going around a turn.

differential lock, interaxle type Used on twin-screw tractors, this valve can be set to lock, both rear axles together so that they pull as one for off-the-road operation. Never used for over-the-road operation.

direct current Electrical current that always flows in one direction only and is the type used in automotive equipment.

direct drive Refers to a condition in which the transmission is in a gear having a 1:1 ratio, that is, when the engine crankshaft is turning at the same rate as the vehicle drive shaft. See **overdrive** and **underdrive.**

disc brakes Brakes that function by causing friction pads to press on either side of a disc rotating along with the wheel.

disc wheel A single unit that combines a rim and a wheel.

dispatcher Person in charge of dispatching.

dispatching The scheduling and control of intercity traffic and intracity pickup and delivery.

distributor A device for distributing electric current to the spark plugs of a gasoline enginer so that they fire in the proper order.

diversion A change made in the route of a shipment in transit. See **reconsignment.**

divert To change the route of a shipment in transit. See **reconsignment.**

dock A platform where trucks load and unload.

dock receipt A receipt given for a shipment received or delivered at a pier or dock. Whe delivery of a foreign shipment is completed, the dock receipt is surrendered to the transportation line and a bill of lading is issued.

dock-walloper (slang) One who loads and unloads vehicles and handles freight on the dock.

document Anything printed, written, etc., relied upon to record or prove something.

documentation (1) the supplying of documents; (2) the documents that are supplied.

dolly A small platform mounted on wheels that is used in a warehouse to move objects. Also used in reference to (1) The coupling device composed of one or two axles and a fifth wheel used to convert a semi-trailer to a full trailer so it can be coupled to the rear of a tractor-trailer unit, making the combination into a double-bottom rig; (2) landing gear on a trailer.

D O T HAZARDOUS MATERIALS SHIPPING LABELS See **labels, D O T HAZARDOUS MATERIALS WARNING.**

D O T HAZARDOUS MATERIALS WARNING LABELS See **labels, D O T HAZARDOUS MATERIALS WARNING.**

D O T PLACARDS See **placards, D O T HAZARDOUS MATERIALS WARNING**

double-axle See **tandem axle.**

double-clutching Shifting the gears of a nonsynchronized truck transmission without clashing them, by depressing and releasing the clutch pedal twice.

double drop frame A drop frame trailer with one drop behind the kingpin and one in front of the rear axles. See **drop frame.**

double-reduction rear axle A rear end that reduces the drive line rpm in relation to the rear wheel rpm by means of a double

reduction of gears. Used where very slow speed is needed. Two reductions are made in the differential. See **gear ratio.**

double bottoms See **doubles.**

doubles A combination vehicle consisting of a tractor, a semi-trailer and a full trailer, coupled together. Also called **twins, twin trailers** and most often **double bottoms.**

drag line A method of moving freight carts around a carrier's terminal. Refers to a moving cable (the line) that operates either from a suspended position overhead or in a slot in the floor. The line supplies the motive power (drag) to the carts when they are attached to the line.

drain lines In some fuel systems, unburned fuel is returned to the supply tank through the drain lines. Not found on all tractors.

drayage The charge made for carting, draying, or trucking freight.

drive axle An axle that transmits power to the wheels. A drive axle is a powered axle that actively pulls the load.

drive shaft A heavy-duty tube that connects the transmission to the rear end assembly of the tractor.

drive train A series of connected mechanical parts for transmitting motion.

drivers (Slang) The drive wheels of a tractor.

driver's duty status record book See **log book, driver's daily.**

driver's log See **log book, driver's daily.**

dromedary tractor A tractor with a cargo body placed between the fifth wheel and the cab.

drop frame A trailer frame that drops downward to increase cargo capability without increasing the vertical clearance of the vehicle. Consists of two types: single drop and double drop.

drop it on the nose Uncoupling a tractor from a semi-trailer without lowering the landing gear to support the trailer's front engine.

drop the body (Slang) Unhook and drive a tractor away from a parked semi-trailer.

dry freight Freight that does not need to be shipped at a specific temperature to prevent spoilage.

dry tank Part of brake system. Air passes from wet tank to dry tank. Dry tank is the air reservoir from which the air is drawn for operating the brake system.

duals A pair of wheels and tires mounted together on the same side of one axle.

dummy coupler A fitting used to seal the opening in an air brake hose connection (glad hands) when the connection is not in use. Sometimes called a dust cap.

dump body Truck or trailer body of any type which can be tilted to discharge its load.

dunnage The material used to protect or support freight in trucks. The weight of dunnage is shown separately on the bill of lading since it is material used around a cargo to prevent damage. Often it is transported without charge.

dusk The beginning of darkness in the evening.

dust cap See **dummy coupler.**

dust shield Sheet metal shield on brake assembly used to keep debris from brakes.

duty A tax levied by a government on imports and exports.

dynamometer A device for measuring the work output of an engine. See **brake horsepower.**

electrical line adapter See **adapter.**

electrolyte A chemical solution (usually sulfuric and water) that covers the positive and negative plates in the cells of an automotive storage battery, it reacts with the chemicals of the plates to produce voltage and current flow.

elevator (Slang) A hydraulic or electrically powered end gate on a truck or trailer.

embargo To resist or prohibit the acceptance and handling of freight. A formal notice that certain freight will not be accepted.

emergency (air line) See **air lines.**

emergency brake release Will override the spring brake control in the event air pressure is lost. You must hold it while pulling out on the spring brake control. For emergency use only.

emergency stop See **stop and emergency stop.**

emission Refers to gases and other materials vented to the atmosphere by the exhaust system.

encroachment The act of intruding or going beyond the proper limits, such as encroachment on another lane of traffic.

engine water jackets Hollow chambers that surround the cylinders and other parts exposed to high temperatures in the engine. They circulate coolant around engine parts to cool them.

enroute On the way to a destination.

enroute inspection See **inspection.**

entry (customs) A statement of the kinds, quantities, and values of goods imported together with duties due, if any, and declared before a customs officer or other designated officer

environmental Relating to the environment (air, water, land). Air and water pollution are environmental problems.

escape ramp A ramp on a steep downgrade that can be used by a truck driver to stop a runaway truck when brakes have failed. The ramp often has a soft gravel surface and forms a steep upgrade to stop the truck. Sometimes called a runaway truck ramp.

ether Substance used as a starting aid for diesel engines in freezing or subfreezing weather.

etiologic agents See **HAZARDOUS MATERIALS.**

evasive Tending or seeking to evade. Evasive action is action taken to evade or escape from a problem, danger, or hazard.

excess freight Freight in excess of the quantity shown on freight bill.

exchange bill of lading A bill of lading issued in exchange for another bill of lading.

exclusive use of truck A request made by a shipper on the bill of lading for the sole use of a vehicle, i.e., no other freight to be carried.

exempt carrier Trucks hauling certain commodities are exempt from Interstate Commerce Commission economic regulation. By far the largest portion of the exempt carriers transport agricultural commodities or seafood.

exhaust manifold That part of the exhaust system that carries the exhaust gases from the cylinders to the exhaust pipe.

exhaust pipe Pipe connected to muffler through which exhaust gases are released. See **tailpipe** and **stack.**

exhaust ports Connecting passages from the inside to the outside of the cylinder heads.

exhaust stroke Phase of the four-stroke cycle when waste gases are pushed out the exhaust valve.

exhaust valves Open to discharge the burned gases from the combustion chambers.

expandable (trailer) Flat bed trailer which can be expanded beyond its regular length to carry larger shipments.

expediting To accelerate a process. Expedited freight service is usually superior to normal service. Dispatching less than truckload quantities on a single truck for quick delivery is an example of expedited service. Such service frequently necessitates payment of "exclusive use of vehicle" freight charges.

explosives See **HAZARDOUS MATERIALS.**

export To send goods to a foreign country.

external contracting brake A type of brake in which the brake shoes contract against the outside of the brake drum.

eye lead time Term used to describe the distance that a driver is looking ahead on the road. A 12-second eye lead time means that the driver is looking ahead the distance he will travel in 12 seconds' time.

Federal Highway Administration (FHWA) Part of the U.S. Department of Transportation. See **Bureau of Motor Carrier Safety.**

Federal Motor Carrier Safety Regulations (FMCSR) Governs the operation of trucks and buses being operated in interstate or foreign commerce by common, contract and private motor carriers. Among other things, the FMCSR specifies insurance requirements, driver qualifications, driving of motor vehicles, hours of service for drivers, reporting of accidents, inspection and repair of vehicles as well as parts and accessories needed for safe operation.

false billing Describing freight on shipping documents so as to misrepresent the actual contents or weight of shipment.

fifth wheel The coupling device located on the tractor's rear frame that is used to join the front end of the trailer to the tractor. It is a flat, rounded plate with a V-shaped notch in the rear.

first aid The immediate and temporary care given the victim of an accident or sudden illness until the services of medical personnel can be obtained.

fishy-back Transportation of truck trailers or highway freight containers on ships or barges.

fixed charges Carrier costs that do not vary with an increase or decrease in traffic. An accounting classifications.

flammable gas See **HAZARDOUS MATERIALS.**

flammable liquids See **HAZARDOUS MATERIALS.**

flap, tire Used in tube type tires, it is a piece of rubber that separates the tube from the bead seat.

flatbed See **lowbed.**

flexi-van Trailers with detachable container bodies that are loaded on specially constructed flat cars equipped with two turntables.

float Flat bed semi-trailer.

F.M.C.S.R. See **Federal Motor Carrier Safety Regulations.**

fog lamps Auxiliary headlights for use during fog and mist.

foot brake valve Valve which the driver depresses with his foot, which controls the amount of air pressure delivered to or released from the brake chambers. Also called a **treadle valve.**

forklift A machine used to move goods loaded on pallets or skids.

forklift truck A self-propelled vehicle for lifting, stacking, etc., heavy objects that may be loaded on pallets or skids; it consists typically of projecting prongs that are slid under the load then raised or lowered.

four-banger (slang) Four-cylinder engines.

four-by-four (Slang) Four speed transmission and four speed auxiliary transmission.

frame A metal support for the body, power unit, and running gear; the backbone structure around which the vehicle is assembled. Contains the engine mounts, fuel tank supports, etc.

free on board Delivered (by the seller) aboard the train, ship, truck, etc., at the point of shipment, without charge to the buyer. Usually indicates place where responsibility for expenses and risk for goods is passed from seller to buyer. For example, FOB motor carrier would usually mean that a price quoted for goods would include loading on a truck at the seller's building. This term is not always used precisely, and it is best to qualify it to show exactly what is covered. Abbreviated F.O.B.

free time The time period freight is held before storage charges are applied.

free-astray A shipment miscarried or unloaded at the wrong terminal is billed and forwarded to the correct terminal free of charge because it is astray. Hence the term "free-astray." See **astray freight.**

freight Anything being transported.

freight bill Document for a common carrier shipment, Gives a description of the freight, its weight, amount of charges, the rate for charges, taxes and whether collect or prepaid. If the charges are paid in advance or are to be collected at the origin, it is called a prepaid freight bill. If charges are to be collected at destination, it is called a destination or collect freight bill.

freight charge Payment due for freight transportation.

freight claim A demand upon a carrier for the payment of overcharge or loss or damage sustained.

freight forwarder A company that assembles small shipments from various shippers into larger shipments, usually full truck or car load. Forwarders send these consolidated shipments to a station where they are disassembled and routed to the proper destinations. The stations are called break bulk stations. Forwarders try to make up a full truck or car load shipment to take advantage of the better rate for a full load.

friction The resistance to motion of two moving objects or surfaces that touch.

front brake limiting valve Found only on tractors having brakes on the front axle. Limits amount of braking force applied to the front axle brakes under conditions where locking up the front brake might adversely affect the driver's ability to safely steer the vehicle. Usually controlled by a two-way switch mounted on the dashboard. When in "Dry Road" position, limiting valve is not operating. In "Slippery Road" position, the valve is in full operation (only found on the pre 1975 model tractors).

front haul (1) The front portion of a trip, from start to destination; (2) Freight carried on the front portion of the trip. See **back haul.**

fuel filter Device for cleaning engine fuel.

fuel gauge Registers amount of fuel in fuel tank. One for each tank

fuel pump Pump that moves a fuel from the fuel tank to the engine.

full capping Application of new rubber to the tread area and some distance down the buttress of a used tire.

full trailer A trailer with both front and rear axles; used as the second trailer in a double-bottom rig or hooked behind a straight truck to form a truck-trailer combination. A semi-trailer can be converted into a full trailer by the use of converter dollies. See **semi-trailer.**

furniture van body Truck body designed for the transportation of household goods; usually a van of drop-frame construction.

fuse A wire or strip of easily melted metal, usually set in a plug, placed in a circuit as a safeguard; if the current becomes too strong, the metal melts, thus breaking the circuit.

fusee A colored burning flare used as a signal to warn other road users.

GBL Government bill of lading.

gasket A thin piece of material installed in a joint to prevent leakage.

gateway A point at which freight moving from one territory to another is interchanged between transportation lines.

gear box temperature gauge Indicates temperature of lubricant in transmission.

gear pump Located at the rear of the fuel pump. Driven by the fuel pump main shaft. Consists of a single set of gears to pick up and deliver fuel throughout the fuel system. From gear pump, fuel flows through the filter screen and to the pressure regulator.

gear ratio The relationship of the number of teeth on or revolutions of one gear to the number of teeth on or revolutions of the gear with which it is engaged.

generator Device that converts mechanical energy to electrical energy by means of electromagnetic induction. Automotive generators use the mechanical force of engine rotation to produce voltage and electrical current. See **A.C. GENERATOR** and **D.C. GENERATOR**.

glad hands Connectors mounted on the front of a trailer for connecting air lines from the tractor.

goods Merchandise.

gooseneck The curved section of a trailer frame that includes the kingpin and the fifth wheel apron.

governor (air) Device to automatically control the air pressure being maintained in the air reservoirs. Keeps air pressure between 90 and 120 psi. Prevents excessive air pressure from building up.

governor (fuel) A system of springs and weights with two functions: maintains sufficient fuel for idling with the throttle control in "Idle" position, and cuts off fuel above maximum rated rpm.

grain body Low side, open-top truck body designed to transport dry flowable commodities.

groove On a tire, the space between adjacent tread ribs.

grounded circuit A circuit in which a damaged wire or other current carrying device accidentally touches the vehicle frame or some metal object connected to the vehicle ground. See **circuit.**

gross combination weight The weight of the tractor, trailer, and cargo (abbreviated GCW).

gross ton 2,240 pounds. More commonly called a long ton.

gross vehicle weight The weight of an empty tractor or trailer (abbreviated GVW).

gross weight (1) The weight of an article together with the weight of its container and the material used in packing; (2) as applied to a truck, the weight of a truck together with weight of its entire contents. See **gross vehicle weight** and **gross combination weight.**

half-cab A tractor having only a half of a cab along the left side of the engine.

half capping Application of new rubber only to the tread area of a used tire. See **full capping.**

hand throttle A manually set throttle in a tractor that is used to maintain a certain engine speed. See **throttle.**

hand valve The valve that controls only the trailer brakes. See **trailer brake.**

hazard A source of danger.

hazardous Involving risk or danger to persons or property.

HAZARDOUS MATERIALS The various substances (materials, chemicals, gases, etc.) which the U.S. Government agencies have determined could cause harm or danger to public health and safety when being transported improperly. There are approximately 24 different DOT transport related, broad types or classifications of hazardous materials all of which have strictly enforceable laws or regulations covering such things as types of containers or packages to be used for shipping, the labeling of the packages and/or the placarding of the vehicles, among other requirements. The hazardous material classifications and an example of each are as follows:

blasting agents Any material designed for blasting that is not easily detonated, such as ammonium nitrate fuel oil mixture.

combustible liquid A liquid that can be burned such as furnace oil, also see **Flammable Liquids.**

corrosive material A substance which will eat away or "burn" your skin such as battery acid.

Hazardous Materials (Cont'd)

etiologic agent Items which are likely to cause diseases in human beings shipped for laboratory analysis.

explosives, Class A An example is dynamite.

explosives, Class B An example is special fireworks.

explosives, Class C An example is small arms ammunition.

flammable gas Any gas (or vapor) usually kept under pressure and which easily catches fire such as propane gas used for cooking.

flammable liquid A liquid that catches fire very easily such as gasoline. Also see **COMBUSTIBLE LIQUID.**

flammable solid A solid material that catches fire easily such as charcoal.

irritating material A liquid or solid material which when exposed to air or fire gives off dangerous or very irritating fumes such as tear gas used for riot control.

non-flammable gas A gas (or vapor) usually kept under pressure and does not burn such as nitrogen used in trailer refrigerator systems.

organic peroxide A substance which is a strong oxidizing agent and fire hazard commonly used in the bleaching of leather.

oxidizer A substance which gives off oxygen which makes it a fire hazard such as ammonium nitrate which is used as a fertilizer by farms.

poison A Any liquids or gases that are extremely dangerous to human life, an example of which is hydrorganic acid (prussic acid) used in the making of pesticides.

poison B Less dangerous poisons than POISON A but are still dangerous to human health such as arsenic used for pesticides.

radioactive material Any material which gives off atomic radiation such as fuel in nuclear powered electrical generating plants.

ORM (other regulated material) Any substance which poses a human health and safety risk and which does not fit any of the other hazardous materials classes. There are 5 classes of ORM which are:

Hazardous Materials (Cont'd)

ORM-A Any material which can cause an uncomfortable reaction in human beings exposed to it such as chloroform.

ORM-B Any substance which can cause damage to the transport vehicle if leaked during transport such as mercury.

ORM-C Any substance which does not fit the ORM-A or ORM-B classification but which makes it unfit for transportation unless properly prepared such as bleaching powder.

ORM-D Any material packaged in small quantity for consumer use that would otherwise be subject to the hazardous material classifications, but due to the fact it is packaged in small quantities poses a minimum risk, such as small cans of cigarette lighter fluid.

ORM-E Any substance which is not included in any of these other hazardous materials classes but which is subject to the Hazardous Materials Regulations such as some forms of Hazardous Waste. Example - sludge from manufacturing procedures and Hazardous Substances such as materials used to eliminate fungus.

spontaneously combustible material (solid) Any solid substances which, when exposed to air may increase in temperature and/or catch fire, such as wet hay.

water reactive material (solid) Any solid material (including sludges or pastes) which when accidently gotten wet may catch fire and/or give off unhealthy gases such as magnesium metal used in making car engines.

waste, hazardous Materials that are hazardous which are being shipped to a disposal site or dump, and which requires special shipping manifest papers as required by the U.S. Environmental Protection Agency.

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haz mat Nickname for **HAZARDOUS MATERIALS.**

hazardous shipping labels See **labels, D O T HAZARDOUS MATERIALS WARNING.**

hazardous warning labels See **labels, D O T HAZARDOUS MATERIALS WARNING.**

hazardous warning placards See **PLACARDS, D O.T HAZARDOUS MATERIALS WARNING.**

haz mat placards See **PLACARDS, D.O.T. HAZARDOUS MATERIALS WARNING.**

headache rack (Slang) Heavy bulkhead mounted behind the cab to protect it from a shifting load.

header bar A hinged, rear cross piece on open-top trailer, that can be swung out of the way to load high objects.

header board See **bulkhead.** Also known as headache rack (slang).

heater service Heat protection of freight that would be damaged by freezing.

high-cube A truck body or semi-trailer with above average cubic content. Usually constructed with low floors and thin walls.

hi-low Nickname for a forklift truck.

hole (Slang) A shift position in a gear box, e.g., low hole means the lowest gear.

hopper body Truck or trailer body capable of discharging its load through a bottom opening without tilting.

horse van body Truck designed for the transportation of valuable saddle horses.

hose tenders Devices that keep air and electrical lines between the tractor and trailer suspended and out of the way. Also known as "pogo sticks."

hot load (Slang) Rush shipment of cargo.

hydraulic brakes Brakes that depend on the transmission of hydraulic pressure from a master cylinder to the wheel cylinders.

hydrometer An instrument used to determine the state of charge of a battery.

hydroplaning Action produced by water on the roadway, in which tires lose traction (contact with the road) and skim along the water's surface, thus causing dangerous loss of directional control.

ICC See **Interstate Commerce Commission.**

identification lights Three lights mounted in a row on vertical centerline of the vehicle front and rear. Front lights are amber. Rear lights are red. Required by FMCSR on vehicles 80 inches or more in width. Also see **clearance lights.**

ignition coil A part of the electrical system that converts low voltage electricity to high voltage electricity.

import To receive goods from a foreign country.

in bond Merchandise on which a duty or import tax is still due (unpaid) is referred to as "in bond." Bonding guarantees that the duty will be paid to the government.

initial carrier The tranportation line that picks up a shipment from the shipper; in other words, the "first" carrier.

initial point The point at which a shipment originates.

injector A device found in a diesel engine that changes liquid fuel oil into a mist or spray and meters it to each cylinder.

injector pump A pump used to deliver fuel to the injectors under very high pressure.

inspection (vehicle) Checking over the vehicle parts and systems for problems and malfunctions and to see that everything is in order and in place. Pre-trip inspection is a thorough inspection done before the trip. Enroute inspections are made periodically during the trip. Post-trip inspections are done after the trip, so that problems and malfunctions can be reported to maintenance personnel.

instruments Devices for indicating or measuring conditions, performance, position, direction, etc.

insulated body Truck or trailer body designed for transportation of commodities at controlled temperatures. It may be equipped for refrigeration, heating or both.

insurance A contract binding a company to indemnify an insured party against a specified loss or damage. Motor carriers purchase many types of insurance, including cargo insurance, property damage insurance, public liability insurance, and workmen's compensation insurance.

intake manifold That part of the fuel system that carries the air or air/fuel mixture to the cylinders.

intake ports Provide the connecting passages from the outside of the cylinder heads to the inside head openings (the valves).

intake stroke Phase of the four-stroke cycle when fuel and air enter the cylinder.

intake valves Valves used in an engine to admit air into the combustion chambers of the cylinders.

interaxle differential lock See **differential lock.**

interchange point A station at which freight in the course of transportation is delivered by one transportation line to another.

interline freight Freight moving from point of origin to destination over the lines of two or more transportation companies.

interline waybill A waybill covering the movement of freight over two or more transportation lines.

internal combustion engine Any engine that burns fuel within itself, as a source of power.

internal expanding brake A type of brake designed with the brake shoes on the inside of the braking drum to expand against the inner surface of the drum.

interstate Between states. See **intrastate.**

Interstate Commerce The Interstate Commerce Act defines interstate as transportation from one state or territory of the United States or the District of Columbia to any other, or from any place in the United States through a foreign country to any other place in the United States, or from or to any place in the United States.

Interstate Commerce Act An Act of Congress regulating the practices, rates and rules of transportation lines engaged in handling interstate traffic.

Interstate Commerce Commission The Federal agency charged with enforcing the Acts of Congress affecting interstate commerce.

intrastate Within the borders of a State. See **interstate.**

Intrastate Commerce Transportation having origin, destination and entire transportation within the same State.

invoice (1) An itemized list of goods shipped to a buyer stating quantities, prices, fees, shipping charges, etc., often with a request for payment; (2) a shipment of invoiced goods.

irritating material or irritant See **HAZARDOUS MATERIALS.**

jacking Turning a tractor while backing so as to cause the trailer to assume a "jackknife" position. Combines with "chasing" to allow the trailer to be steered along the prescribed path. See **chasing.**

jacking it around Backing a semi-trailer around a very sharp curve.

jackknife (1) To place the trailer at a sharp angle to the tractor; (2) a type of skid in which either the tractor or the trailer loses traction and slides sideways.

Jake Brake (Slang) The Jacobs engine brake. Used as an auxiliary braking device on a tractor. Builds up back pressure in the engine by preventing the exhaust from escaping so that the engine slows.

Jeep wheel See **joe dog.**

joe dog Device with a dead axle that converts a single-axle tractor to a tandem-axle tractor. It hooks over the tractor's fifth wheel, replacing it with another for the semi to be hooked onto.

Johnson bar Type of prybar used to maneuver heavy cargo.

jumped the pin Missing the fifth wheel pin on the trailer when coupling tractor to trailer.

kingpin The bolt-like device on the underside of the front of a semi-trailer that fits into the tractor's fifth wheel to couple the tractor and the trailer together.

kingpin weight Weight of the trailer at the kingpin or the trailer weight applied to the fifth wheel.

knocked down A freight classification term denoting that an article is partially or entirely taken apart (not **set up**). Abbreviated KD.

known damage Damage discovered before or at the time of delivery of a shipment.

known loss Loss discovered before or at the time of delivery of a shipment.

labels, D O T HAZARDOUS MATERIALS WARNING A regulation type label (or sticker) that is required to be placed on any package/container of hazardous materials which identifies the type of hazard.

laden weight The weight of a vehicle and its cargo. See **gross weight.**

lading That which constitutes a load. The freight in a vehicle.

landing gear A slang term for the support legs that hold up the front end of a semitrailer when it is disconnected from a tractor. See **dolly.**

layover To take a rest period of eight or more hours before continuing trip, or any extended off-duty period away from the home terminal.

layover time The non-working time that a road driver spends away from his home terminal before being dispatched to some other destination.

lead-acid battery A commonly used automotive battery in which the active materials are lead, lead peroxide, and a solution of sulfuric acid. See **storage battery.**

less-than-truckload rate Refers to cargo shipments of less than truckload size and weight; usually handled at proportionately higher rates and freight charges. Abbreviated LTL.

liable Legally bound or obligated to make good any loss or damage that occurs.

liability Anything for which a person is liable.

lien A legal claim upon goods for the satisfaction of some debt or duty.

line haul The movement of freight between major cities or terminals. Line haul operations do not include pick-ups or deliveries. Line haul service is also commonly referred to as over-the-road (abbreviated OTR) operations or "runs".

live axle Same as **drive axle** or **powered axle.**

livestock body Truck or trailer designed for the transportation of farm animals.

lock ring In three-piece wheel rims, the lock ring holds the side ring firmly on the rim base.

log See **log book.**

log body Truck or trailer body designed for the transporation of long items. See **pole trailer.**

log book, driver's daily A legal record kept by interstate truck and bus drivers in which they make entries showing their daily number of hours worked, vehicles driven, etc. The maintenance of such records is required by the Federal Motor Carrier Safety Regulations. Recently the name was officially changed to **Driver's Duty Status Record Book.**

long ton 2,240 pounds. Also called a **gross ton.**

louver Opening in cab, hood radiator sheel, or compartment for the purpose of ventilating.

low bed An open trailer with drop frame construction used primarily to haul heavy equipment. Also known as flat bed or low boy.

low boy See **low bed.**

low-air-warning device Any mechanical means of warning a truck driver that his vehicle is not maintaining the proper amount of air pressure needed to operate the brakes, etc. Can be a buzzer, a flashing red light on the instrument panel, or a small red metal flag that drops into the driver's line of vision.

low cab forward A tractor with the cab mounted forward of the engine to allow cab entry height to be reduced for ease of entry and exit.

lumber body Platform truck or trailer body with rollers designed for the transportation of lumber.

manifest A document describing a shipment or the contents of a vehicle or ship.

marker lights Also called clearance or running lights. See **clearance lights.**

marks Letters, numbers, and/or characters placed on a package for purposes of identification.

memorandum bill of lading A duplicate copy of a bill of lading.

mile 5,280 feet.

mileage Distance in miles.

minimum rate The lowest lawful rate that may be charged for transporting a shipment.

minnie (Slang) Less than 100-pound shipment.

mixed truckload A truckload of different freight articles combined into a single shipment.

mode Frequently used to refer to the basic divisions of the transportation industry. The principal modes of transportation are truck, rail, air and water.

moisture-release valve A valve in the air line that emits some air each time the brakes of the tractor are applied. Prevents water and moisture from collecting in the air system.

motor carrier An individual, partnership or corporation engaged in the transportation of property or persons.

motor vehicle Any vehicle, self-propelled or drawn by mechanical power, designed for operation on the highways or natural terrain in the transportion of property or passengers.

muffler Noise-absorbing chamber used to quiet the engine's noise.

mule (Slang) See **yard mule.**

multi-stop body Fully enclosed truck body with driver's compartment designed for quick, easy entrance and exit.

negligence Failure to exercise the degree of care the law demands.

nested Packed one within another.

net ton 2,000 pounds. Also called a **short ton.**

net weight (a) The weight of an article clear of packing and container; (b) as applied to a truckload, the weight of the entire contents of the truck.

nonflammable gas See **HAZARDOUS MATERIALS.**

nozzle Same as injector. See **injector**

octane number Rating applied to gasoline. Indicates the anti-knock properties of the gasoline. The higher the number, the greater the antiknock properties. See **cetane number.**

odometer An instrument that measures the total number of miles traveled by a vehicle.

off-tracking A term used to refer to the path taken by the rear end of a vehicle when turning. The path of the rear wheels is shorter than the path of the front. The off-track is much shorter on a tractor-trailer. Drivers must compensate for off-tracking in turns and on curves.

ohm A unit of measurement of electrical resistance that allows an electromotive force of one volt to produce a current flow of one amphere.

ohmeter An instrument that measures the amount of resistance (in OHMs) in a circuit or in an electrical component outside the circuit.

oilfield body Heavily constructed platform-type truck body equipped with instruments for oil drilling.

oil filter Device for cleaning and purifying the engine lubricating oil.

oil pressure gauge Measures pressure of engine lubricating oil. Pressure varies with engine speed and oil viscosity. Sudden drop of pressure indicates a problem.

oil seal A device used to retain lubricant in the bearing area of the wheel. The sealing part of the seal is usually made of a resilient material such as synthetic rubber or leather, which is assembled into a wheel or the hub bore.

open top (trailer) A truck or trailer body with sides but without any permanent top, often used for heavy equipment that must be lowered into place by crane. Nicknamed **ragtop.**

order bill of lading See **bill of lading.**

organic peroxide See **HAZARDOUS MATERIALS.**

ORM-A See **HAZARDOUS MATERIALS.**

ORM-B See **HAZARDOUS MATERIALS.**

ORM-C See **HAZARDOUS MATERIALS.**

ORM-D See **HAZARDOUS MATERIALS.**

ORM-E See **HAZARDOUS MATERIALS.**

out-of-service driver Driver declared out-of-service by a government representative because of hours of service violations. The out-of-service form indicates when such a driver may commence driving again.

out-of-service vehicle A vehicle that cannot pass the government safety inspection and is declared out-of-service. Cannot be driven until the problem or problems are corrected or repaired.

outriggers Devices used for increasing width of low boy trailer.

over freight Freight separated from its waybill and bearing no identifying marks. See **astray freight.**

over on bill Freight in excess of that specified by the freight bill or the bill of lading.

over, short and damaged (OS&D) Discrepancies between freight on hand and freight shown on the bill. Freight not covered by billing is "over." If some is missing, it is "short." Freight received in bad condition, is "damaged." Freight agents file an OS&D report showing these discrepancies.

over without bill When a terminal has freight without its bill of lading or freight bill.

overage Freight in excess of the quantity or amount shown on the bill of lading or other shipping document.

overcharge To charge more than the amount provided in the proper tariff.

overdrive Refers to a condition in which the vehicle's transmission is in a gear having a ratio greater than 1:1, that is, the engine crankshaft turns at a slower rate than the vehicle drive shaft. Opposite of **underdrive.** (Also see **direct drive**).

overdriving the headlights Driving at a speed that will not permit you to stop your vehicle within the distance you can see ahead.

overhang (front) Distance from centerline of front axle to front of vehicle.

overhang (rear) Distance from centerline of rear axle to rear of vehicle.

overriding the governor (overspeeding) When the weight of the vehicle drives the engine beyond governed speed. Happens on hills when vehicle is not in a low enough gear and is not supplemented as necessary by light, steady brake application. The governor does not control the engine speed when the vehicle is driving the engine.

oversized vehicle Any vehicle whose weight and/or dimensions exceeds State regulations.

over-the-road (OTR) See **line haul operation.**

owner-operator A trucker who both owns and drives his tractor.

oxidizers See **HAZARDOUS MATERIALS.**

packing, improper Any packing that does not comply with the classification rules and regulations for proper packing.

packing list A detailed specification of packed goods.

pajama wagon (Slang) Sleeper tractor.

pallet A portable platform for holding material for storage or transportation.

palletized Stacked on pallets.

panel body Small, fully enclosed truck body often used for small package delivery.

parallel circuit A circuit in which all control and current consuming devices are arranged in several independent branches. Each branch provides a separate current path through the circuit components on this branch only. See **series circuit.**

payload The cargo or freight that a vehicle hauls.

peddle run Truck route with frequent delivery stops.

peg leg (Slang) Liftable axle with only one wheel at each end.

perishable freight Freight subject to decay or deterioration.

permit A document granting permission.

pig Trailer transported on flat rail car.

piggyback Transportation of a highway trailer on a railway flat car.

pigtail (Slang) Electrical cable used to transmit power from the tractor to trailer.

pilferage Stealing.

pintle hook Coupling device at rear of truck for the purpose of towing trailers.

piston A device that moves up and down in the engine cylinder and provides power to the crankshaft.

PLACARDS, D O T HAZARDOUS MATERIALS WARNING A regulation type of sign that is required to be displayed on all four sides of a motor vehicle when it is hauling hazardous materials.

platform body Truck or trailer body with a floor, but no sides or roof.

ply A layer of rubber-coated parallel cords on a tire.

point of origin The terminal at which a shipment is received by a transportation line from the shipper.

point system States assign points for traffic violations toward driver license suspension.

poison A See **HAZARDOUS MATERIALS.**

poison B See **HAZARDOUS MATERIALS.**

polarity The condition of having opposite poles. In electricity, the poles are the positive and negative terminals posts of a battery. In magnetism, the poles (north and south) are the ends of a magnet or electromagnet.

pole trailer Trailer composed of a single telescopic pole, a tandem rear-wheel unit, and a coupling device used to join the trailer to a tractor. Pole trailers are used to transport logs or similar items, when chained together becomes a rigid unit thereby serves as its own trailer body. Pole trailers are adjustable in length.

ports Apertures in engine block for the passage of gas or liquid.

possum belly (Slang) Livestock trailer with a drop frame to haul animals on 2 levels.

post-trip inspection See **inspection (vehicle).**

pot torches Safety equipment used on a highway to warn traffic of an obstruction or hazard.

power-lift tail gate A power-operated tail gate capable of lifting load from street level to the level of the truck or trailer floor.

power stroke Phase of the four-stroke cycle when fuel is ignited and combustion take place.

power train The series of parts that transfer the power of the engine to the wheels. Same as drive train.

powered axle See **drive axle.** Commonly called a **live axle.**

prepaid A term denoting that transportation charges have been or are to be paid at shipping point.

prepay To pay before or in advance.

pressure regulator (fuel) A bypass valve to regulate the pressure of the fuel supplied to the injectors. Bypassed fuel flows back to the suction side of the gear pump.

pre-trip inspection See **inspection.**

preventive maintenance A systematic checking and care of equipment to keep repairs to a minimum.

private carrier A company that is not primarily engaged in transportation business and that hauls its own property in its own vehicles. Private carriers do not have to obtain operating authority from the Interstate Commerce Commission, but they must comply with the Federal Motor Carrier Safety Regulations of the Department of Transportation.

privileged vehicle In any situation, the vehicle which has the right-of-way over other vehicles under the law. Also see **burdened vehicle.**

progressive shifting A process of shifting high torque rise engines that involves shifting at lower rpms at slower speeds, and at progressively higher rpms as the speed of the vehicle increases.

prohibited articles Articles of freight which will not be handled.

pro number The abbreviation of the word progressive and is usually prefixed to an agent's record numbers on freight bills, etc.

proof of delivery A motor carrier establishes proof of delivery from delivery receipt copy of freight bill signed by consignee, at time of delivery. This is legal proof of delivery.

public service commission Same as **public utilities commission.**

public utilities commission State agency that regulates public utilities and transportation companies. Sometimes called **public service commission.**

pull the pin Release the fifth wheel lock.

pup (Slang) A short four-wheel trailer which is pulled behind a semi-trailer or a straight truck.

put on the air (Slang) Apply the brakes.

put on the iron (Slang) Put on the tire chains.

pyrometer An instrument that registers the temperature of the exhaust gases.

radiator A device of tubes and fins through which circulating water passes to give off excess heat and thus cool the engine.

radius rods Rods attached to frame and axles to prevent misalignment.

rag top (Slang) Open-top trailer with a tarpaulin. See **open top.**

rain cap Protection device used on exhaust stacks to prevent rain entry when the engine is stopped. Opens and closes automatically. Opens by the pressure of exhaust gases passing out of the stack. When exhaust stops (with engine shut off), the rain cap closes.

reaction time The time that elapses between the point that a driver recognizes the need for action and the time that he takes the action.

recap (driver's daily log) A summary of the hours that a driver has worked. Used to figure out how many hours a driver can work under hours of service regulations. Short for "recapitulation."

recap (tires) (1) To recap a tire by bonding new tread rubber to the used tire; (2) a tire that has been recapped. See **full capping** and **half capping.**

recharge (battery) Feeding a direct current into the cells of a storage battery.

reciprocity (1) Mutual action; (2) exchange of privileges, such as between two states.

reconsignment A change (made in transit) in the route, destination, or consignee as indicated in the original bill of lading.

reefer (Slang) See **refrigerated trailer.**

refrigerated trailer An insulated van-type truck or trailer body equipped with a refrigeration unit. Used for carrying perishable goods. Also called a **reefer.**

regroove To cut new grooves into a tire. This can be done only on tires that are made specifically to be regrooved. They are marked "regroovable."

regulator See **voltage regulator.**

relay emergency valve A combination valve in an air brake system, which controls brake application and which also provides for automatic trailer brake application should the trailer become disconnected from the towing vehicle.

relay valve Valve used to speed up the application and release of the rear wheel brakes.

reparation Compensation for damage.

reservoir pressure air gauge See **air pressure gauge.**

reshipment Goods sent to another destination under conditions which do not make the act subject to reconsignment rules and charges of the carrier. See **reconsignment.**

resistence Opposition to the free flow of electrical current in a circuit.

resistor Any device that "uses up" voltage by opposing, or resisting, the flow of electrical current. Resistors may be current consuming devices such as lamps or motors, or devices which are designed for the purpose of using a specific amount of voltage.

restricted articles Types of freight that cannot be handled at all or may only be handled under certain specific conditions.

revenue waybill A waybill showing the amount of charges due on shipment.

revolutions per minute The number of turns or rotations the engine makes in a minute (abbreviated RPM). Engine RPM is expressed in hundreds on the tachometer.

ride shotgun (Slang) To ride in the passenger seat of the tractor. Said of a co-dirver.

rig (Slang) Truck; tractor-semi-trailer; truck and full trailer, or other combination vehicle.

road, primary A main road or highway.

road, secondary Not a main road or highway. Usually narrower, less direct, and often more winding than a primary road.

rock it To free vehicle from mud or snow by alternately driving forward and reverse.

rolling radius Distance from center of the tire to ground.

rolltop A truck or trailer body with a sliding roof to permit overhead crane loading of freight.

route (1) The course or direction that a shipment moves; (2) to designate the course or direction a shipment shall move; (3) the carrier or carriers over which a shipment moves.

runaway truck ramp See **escape ramp.**

running lights Same as clearance or marker lights. See **clearance lights.**

rural Of or characteristic of the country (as opposed to the city).

saddle tanks Barrel type fuel tanks that hang from the sides of the tractor's frame.

seal A security device to assure that truck doors have not been opened in transit.

secure (1) To guard or protect, such as to secure the scene of an accident; (2) to make firm or tight, such as the cargo tie-downs or to secure the truck after parking; (3) to obtain, such as to obtain help; (4) safe and free from danger, such as secure place to stop.

semi (Slang) For either a tractor-trailer combination; or for a semi-trailer.

semi-trailer A trailer that has only rear axles. The front of a semi-trailer either rests on the tractor or is supported by its landing gear when coupled. See **full trailer.**

series circuit A circuit in which all controls and current consuming devices are connected in a single line, so that current must pass through each device in sequence. See **parallel circuit.**

series-parallel circuit A circuit that is made up of combination of series and parallel circuits.

service (air line) See **air lines.**

set up A freight classification term denoting that an article is put together in its complete state. Not **knocked down.**

shipper A person or agent that ships freight.

shipping labels, hazardous See **Labels D O T HAZARDOUS MATERIALS WARNING.**

shipper's load and count Indicates that the contents of a truck were loaded and counted by the shipper and not checked or verified by the transportation line.

shipper's order The document authorizing release of a shipment traveling on an order bill of lading. See **bill of lading.**

shipping order Instructions to carrier for transportation of a shipment. Usually it is a copy of the bill of lading. Used also as record by the freight agent at origin.

shipping papers Papers used in connection with movement of freight.

shipping permit Authority issued by a transportation line permitting the acceptance and forwarding of goods, against the movement of which, an embargo has been placed.

shock A frequent condition of accident victim in which there is a lack of sufficient blood circulation.

short circuit See **circuit.**

short ton 2,000 pounds. Also called a **net ton.**

shortage When quantity of freight received is actually less than that shown on the documents.

shut-down valve (electric solenoid) Permits the fuel to be shut off or turned on through the use of a switch key similar to that used in automobiles.

shut-down valve (manual type) Located on top of the fuel pump used to shut off fuel supply to the engine. When the plunger is pushed in, the fuel passage to the injectors is opened. When it is pulled out, the fuel passage is closed. It is important to keep the valve pulled out in the "Off" position whenever the engine is not running.

sight gauge A glass window for determining fluid levels, as in a radiator.

sight side The side of the tractor visible by driver, i.e., driver's side. Opposite of **blind side.**

single axle (Slang) Slang for either a tractor with one front axle and one rear axle or a semi-trailer with only one axle.

single drop frame A drop frame trailer with one drop, immediately behind kingpin. See **drop frame.**

single-reduction rear axle A rear end that reduces the drive line rpm in relation to the rear wheel rpm by means of a single combination of gears.

skid (1) A wooden platform on which heavy articles or packaged goods are placed to permit handling; (2) failure of tires to grip the roadway because of loss of traction.

skinnie axle (Slang) A trailer or tractor equipped with only one rear axle.

slack adjuster An adjustable device located on the brake chamber pushrod that is used to compensate for brake shoe wear.

sleeper Truck with a sleeping compartment in the cab.

sleeper berth Area in a tractor where a driver can sleep. Sleeper berths must meet standards set by the Federal Motor Carrier Safety Regulations.

sleeper cab A truck or tractor cab incorporating a bed or bunk.

sliding fifth wheel A fifth wheel assembly capable of being moved forward or backward on the truck tractor to obtain desired load distribution between tractor and trailer axles.

sliding tandem An adjusted bogie beneath the trailer that can be moved forward or backward to distribute the weight between tractor and trailer axles.

slip-seat Relay operation where drivers are changed periodically, but the truck continues from point of origin to final destination of the shipment.

smoker (Slang) Tractor emitting excessive smoke from exhaust.

smokestack See **stack.**

snorkel The extension of pipe for the air intake side of the air cleaner. It enables clean air to be taken in from on the top of the cab.

snub-nose Conventional style tractor with the engine protruding into the cab in order to shorten overall length of the tractor.

solenoid An electromagnetic device that can be used to open and close a circuit (like opening or closing a valve, or engaging the gear of a motor).

spark plug A device in the top of the cylinder composed of two electrodes that provide an electrical spark to ignite the gasoline and air mixture in a gas engine.

speedometer Indicates road speed in miles per hour.

spin out Loose traction on a slippery roadway.

split pickup or delivery An accessorial service of picking up or delivering portions of volume shipments at more than one place within origin or destination point boundaries.

splitter Mechanism that divides a gear into two or more ratios such as **direct, overdrive,** or **underdrive.**

spontaneously combustible materials See **HAZARDOUS MATERIALS.**

spot the trailer To park and uncouple a trailer at a designated location.

spotter Worker in terminal yard who parks vehicles brought in by regular drivers. Also a supervisor who checks the activities of drivers on the road.

spread See **bridge.**

spread tandem A two-axle assembly in which the axles are separated by distances substantially greater than that in conventional assemblies.

spring brake A device that consists of a conventional brake chamber and an emergency or parking brake mechanism for use on vehicles equipped with air brakes. The service brake chamber portion of the spring brake is identical to, and functions the same as a brake chamber. The rear portion of the spring brake, sometimes called the "piggyback," houses a large and powerful spring and diaphragm, which under normal conditions, is held in the released position (spring compressed) by air pressure. If air is exhausted from the spring cavity, the spring expands, forcing the diaphragm, push plate, and rod forward, applying the vehicle brakes. A mechanical release bolt at the rear of the chamber is provided to mechanically cage the spring and release the brakes, if necessary.

spring brake control Controls spring-loaded parking brakes.

stabilizer Device used to stabilize vehicle during turns. Also called a **sway bar.**

stack Vertically mounted pipe (or pipes) that discharges the engine exhaust to the atmosphere. See **exhaust pipe.**

stake body Truck or trailer platform body with readily removable stakes which may be joined by chains, slats, or panels.

starter motor An electric or air powered motor used to set the crankshaft in motion in order to start the engine.

static electricity An electrical charge produced by the gathering of free electrons in one place. The electrons remain at rest until they find a conductor that provides a path to an opposing charge.

steering axle An axle through which directional control of the vehicle is applied. A steering axle may be powered or non-powered. A tractor may have more than one steering axle.

stop (engine) and emergency stop Some tractors are equipped with a starter button and an "engine stop" switch. The engine stop is used to shut off the engine. Some tractors are equipped with an "emergency engine stop" switch to be used only when the engine starts to "run away" (exceeding the safe upper RPM limits). Once the emergency stop has been used, the engine will not start again until a mechanic has made repairs.

stopping distance See **total stopping distance.**

stopping in transit to finish loading or unloading An accessorial service of halting volume shipments to finish loading or do partial unloading at points between origin and final destination.

storage Safekeeping of goods in a warehouse.

storage battery A device that stores voltage and supplies electrical current by means of a chemical reaction between different chemicals. See **lead-acid battery.**

storage charges Payment due for storage.

storage in transit Temporary warehousing of a shipment at a point between origin and destination.

store door delivery Movement of goods to a consignee's place of business.

straight bill of lading See **bill of lading.**

straight job (Slang) Truck with body built onto its chassis; also called **straight truck.**

straight truck A truck with the body and engine mounted on the same chasis. (As contrasted to a combination unit such as tractor-trailer).

strip the trailer (Slang) Unload the trailer.

stroke The maximum distance a piston moves in a cylinder.

suburban Of or characteristic of the suburbs, as opposed to city or **rural.**

suburbs Areas on or near the outskirts of a city.

supercharger A type of blower, connected to the engine crankshaft, that forces air into the intake manifold at higher than atmospheric pressure to increase engine power and performance. See **blower.**

supply (air line) See **air lines.**

supply lines (fuel) The lines that carry a supply of fuel to each injector. Fuel enters the inlet connection and then the injectors.

surcharge A charge above the usual or customary freight charge.

surtax An additional or extra tax.

suspension The system of springs, etc., supporting a vehicle upon its undercarriage or axles.

swamper (Slang) A helper who rides with the driver.

sway bar See **stabilizer.**

swinging meat Sides of slaughtered beef, pork, lamb, etc. that are suspended from special racks in a refrigerated trailer.

synchronized transmission A transmission in which the gears are so constructed as to allow smooth shifting without the need to double-clutch.

tachograph A recording device in a tractor that automatically records the number of miles driven, the speed, the number of stops, and other pertinent statistics.

tachometer A device in the tractor, located on the instrument panel, that indicates the revolutions per minute of the engine's crankshaft.

tag axle The rearmost axle of a tandem-axle tractor if that axle serves only to support additional gross weight. A tag axle does not transmit power.

tailgating Following the vehicle ahead of you at an unsafe distance, i.e., less than your **total stopping distance.**

tailpipe Horizontally mounted pipe that discharges the engine exhaust to the atmosphere. See **stack.**

tandem axle An assembly of two axles, either, none or both of which may be powered.

tandem drive axles Tandem axles on a tractor, both of which propel the vehicle. Same as **twin screw.**

tank trailer A semitrailer consisting of a metal tank for carrying liquid or dry bulk. Also called a tanker.

tanker See **tank trailer.**

tare weight (1) As applied to a loaded motor vehicle, tare weight is the weight of the vehicle exclusive of its contents. (2) Also refers to the weight on a container and/or the material used in the container for packing the merchandise to be shipped.

temperature gauge A device that indicates the temperature of such things as coolant, lubricating oil and gear lube.

tender The offer of goods for transportation, or the offer to place trucks for loading or unloading.

terminal A building for the handling and temporary storage of freight as it is transferred between trucks, i.e., from a city pickup to a line haul truck.

terminal carrier The line haul motor carrier making delivery of a shipment at its destination. Terminal carrier means the last or final carrier.

terminal charge A charge made for services performed at terminals.

terrain Natural features of the land.

test lamp A device used to check an electrical circuit for problems.

theft Feloniously taking and removing property with intent to deprive the rightful owner, the taking of the entire container or article. See **pilferage**.

thermostat Device used to maintain temperature in the engine's cooling system within a desired range by restricting the coolant flow.

throttle Valve that regulates the amount of fuel vapor entering an internal combustion engine; controls the engine speed. Also see **hand throttle** and **accelerator**.

through bill of lading See **bill of lading**.

tie rod Part of the tractor's steering system, it is the connecting rod between the steering arms.

tires, belted bias Body plies are same as those for bias tires. In addition, tires have belt plies that constrict the diameter and give greater rigidity to the tread. Belts are heavier construction and the cords lie in a more circumferential direction than breakers on bias tires.

tires, bias Body plycords lie in a diagonal direction from bead to bead. Tires may also have narrow plies under the tread, called breakers, with cords that lie in approximately the same direction as the body ply cords.

tires, radial Body plycords are placed perpendicularly across the tread from bead to bead. In addition, radial tries have belt plies that run circumferentially around the tire, under the tread. They construct the radial ply cords and give rigidity to the tread, resulting in less rolling resistance which gives better fuel economy.

tires, wide base Same diameter as conventional tires, but have a wider base that provide greater ground contact. Sometimes used to replace dual tires, resulting in cost and weight savings.

toe-in The amount of distance which the front of the front wheels are closer together than the rear of the wheels. Front tires are toed-in to improve steering and increase tire life.

toe-out Opposite of **toe-in**.

tolerance Permissible variation in dimension, weight, etc. For example, some states allow a tolerance in their maximum truck weight limits.

toll A charge made for the use of a facility such as a bridge or turnpike.

ton-mile A unit of measure. The movement of a ton of freight one mile.

tonnage Number of tons.

torque Force having a twisting or turning effect.

torque tube Tube enclosing the drive shaft. Transmits forward or aft motion from rear axle.

total engine displacement Piston displacement times the number of cylinders. Expressed in cubic inches.

total stopping distance The distance the vehicle travels between the time the driver recognizes the need to stop and the time the vehicle comes to a complete stop. Total stopping distance includes perception, reaction, brake lag and braking distance.

trace To check the movement of a shipment.

tracer A request that a carrier locate a shipment to speed its movement or to establish delivery. Or a request for an answer to a previously filed claim or other communication.

traction Adhesive friction, as of tires on pavement.

tractor protection valve Controls flow of compressed air from tractor to trailer; when closed, stops flow of air to trailer. When this happens, the trailer brakes will apply. Used to make sure that air is always available for tractor brakes. Must be in "Normal" position when tractor is hooked up to trailer and in "Emergency" position to unhook trailer.

traffic Persons or property carried by transportation lines.

trailer See **full trailer; semi-trailer.**

trailer brake A hand-operated remote control that applies trailer brakes only. Located on the steering column or dash. Must never be used for parking. Also called hand valve, trolley brake, trolley valve handle, trailer hand brake, and independent trailer brake.

trailer hand brake See **trailer brake.**

transfer pump A pump used to move fuel from fuel tank to injectors or carburator.

transmission Selective gear box providing various combinations of gear ratios.

transport To move traffic from one place to another.

transportation The movement of traffic from one place to another.

treadle valve See **foot brake valve.**

tri-axle An assembly of three rear axles, any or all of which may be powered.

triples A combination consisting of a tractor, a semi-trailer and two full trailers, coupled together. Known as triple headers or triple bottoms.

trolley brake See **trailer brake.**

trolley-valve handle Operates the trailer's brakes. See **trailer brake.**

trucking industry The business activity of carrying goods by truck. Used generally to include carrier, drivers, warehouse and terminal employees, and all others who are directly or indirectly involved in trucking.

truckload (1) Quantity of freight that will fill a truck, (2) quantity of freight weighing the maximum legal amount for a particular type of truck, (3) when used in connection with freight rates, the quantity of freight necessary to qualify a shipment for a truckload rate, which is cheaper than a **less-than-truckload rate.** Abbreviated TL.

turbocharger A type of blower, powered by engine exhaust gases, that forces air into the intake manifold at higher than atmospheric pressure to increase engine power and performance. See **blower.**

turn around A type of trip or "run" in which the driver returns to the origin point immediately after his vehicle is unloaded and reloaded.

twins See **doubles.**

twin screw A truck or tractor with two rear axles, both driven by the engine. Same as **tandem drive axles.**

twin trailers See **doubles.**

two-cycle engine A piston-type internal combustion engine that produces power on every downstroke of the piston.

two-speed axle A drive axle capable of being shifted through two gear ranges in order to double the number of gears available from the transmission.

unclaimed freight Freight which has not been called for by the consignee or owner, or freight that cannot be delivered.

underdrive Refers to a condition in which the vehicle's transmission is in a gear having a ratio less than 1:1, that is, the engine crankshaft turns at a faster rate than the vehicle's drive shaf Opposite of **overdrive.** (Also see **direct drive**).

universal joint A joint or coupling that permits a swing of limited angle in any direction; used to transmit rotary motion from one shaft to another not in line with it.

unstable cargo Cargo that cannot be completely secured against movement, such as cattle, swinging meat, liquids.

unstable freight See **unstable cargo.**

urban Of or characteristic of the city (as opposed to **rural**).

vacuum brake system A brake system in which the brake mechanism is activated by a vacuum.

valuation, actual Actual value of goods required to be shown on bill of lading by shipper, when rate to be applied is dependent on that fact.

valve A device that opens and closes openings in a pipe, tube, or cylinder.

V-belt drive Power transmitted from the drive wheels to a dead axle by means of a V-belt connection. See **belt drive axle.**

V.C.R. Driver's daily vehicle condition report.

via By the way of.

viscosity Resistance of a fluid to flow, as in engine oils.

volt A unit of measurement of electrical potential.

voltage The electromotive force that causes electrons to flow. Voltage is the difference between two opposing charges, such as the positive and negative plates of a storage battery. Voltage can be present without current flow. But current cannot flow unless voltage is present.

voltage drop The "using up" of voltage in a circuit. Voltage drop can be caused by resistance in the circuit wiring, current consuming devices (such as lamps, motors etc.) and by resistors.

voltage regulator A device that controls the voltage output of a generator.

voltmeter Indicates output of alternator in volts.

warehouse A place for the reception and storage of goods.

warehouse receipt A receipt for goods placed in a warehouse (may be issued as a negotiable or non-negotiable document).

warehouseman A person in the business of receiving goods and merchandise to be stored in his warehouse.

warehousing The storing of goods.

warning labels See **LABELS, D.O.T. HAZARDOUS MATERIALS WARNING.**

water level warning light Lights up when coolant level in radiator drops below required level. Similar lights will indicate low oil pressure or high coolant temperature, depending on the type of engine.

water pump Pump that circulates the coolant through the engine cooling system.

water reactive material See **HAZARDOUS MATERIAL.**

water temperature gauge Indicates temperature of engine coolant.

watt Unit of measurement of electrical power.

waybill A document prepared by a transportation line at the point of origin of a shipment, showing the point of origin, destination, route, consignor, consignee, description of shipment and amount charged for the transportation service. Forwarded with the shipment, or sometimes direct by mail, to the agent at the transfer point or waybill destination. The waybill is basically a description of goods and shipping instructions.

weighmaster A person who operates a scale for the weighing of freight or motor vehicles. A certified weightmaster is one who has been licensed by some governmental authority as skilled in the art of proper weighing.

weight sheets Itemized list furnished by shippers to weighing bureaus, itemizing articles in each consignment.

wet clutch A type of clutch that operates in an oil bath.

wet goods Liquids.

wet tank Part of the air brake system. Compressed air produced by the compressor goes to the wet tank, which collects any water and engine oil that the air has in it. This tank must be drained at least once a day.

wheelbase Distance (in inches) from center of hub of front wheel of a vehicle to center of hub of back wheels or the center of the space between the tandems.

winch rig Straight truck or tractor with a winch and/or a hoist.

woodchuck (Slang) Driver with low job seniority.

wrecker Truck designed for hoisting and towing disabled vehicles.

yardbird (Slang) A driver who connects and disconnects tractor-semi-trailer combinations and moves vehicles around the terminal yard.

yard goat (Slang) See **yard mule.**

yard jockey (Slang) Person who operates a yard tractor or yard mule, a special tractor used to move semi-trailer around the terminal yard.

yard mule (Slang) Tractor used to move semi-trailers around the terminal yard.

LIST OF ABBREVIATIONS

amt.....amount
amp.....ampere
APU.....authorized pickup
arr.....(1) arrive, (2) arrival
art.....article
ATA..American Trucking Associations, Inc.
av.....average
avg.....average
A/W.....actual weight
BB.....break bulk
BBC.....length of tractor in inches from bumper to back of cab
bbl.....barrel
BC.....distance in inches from back of cab to end of frame
BHP.....brake horsepower
BL or B/L.....bill of lading
bls.....bales
BMCS.....Bureau of Motor Carrier Safety
BTW.....behind-the-wheel
bu.....(1) bushel, (2) bureau
bx.....box
CA....distance in inches from back of cab to centerline rear axle
CAE.....cab-alongside-engine
COE.....cab-over-engine
CBE.....cab-beside-engine or cab-behind-engine
con.....conventional
chg.....charge
ck.....(1) cask(s), (2) check
CL.....(1) connecting line, (2) car load
c/o.....care of
COD.....cash (or collect) on delivery
coll.....collect
comb.....combination
com'l.....commercial
cr.....(1) credit, (2) creditor
CR.....carrier's risk
cty.....county
cu ft.....(1) cubic foot, (2) cubic feet
cwt.....hundred weight
cyl.....cylinder
dba.....doing business as
dely.....delivery
diam.....diameter
diff.....differential
disc..... discount
disp.....(1) dispatch, (2) dispatcher
dist.....(1) district, (2) distance
div.....division
dk.....dock
D.O.T. .....Department of Transportation
EB.....eastbound
eg.....exempli gratia (for example)
eq.....equal
est.....estimated
est wt.....estimated weight
ETA.....estimated time of arrival
etc.....et cetera (and other things; and so forth)
ETD.....estimated time of departure
ex.....(1) exchange, (2) example
ex BL.....exchange bill of lading
exp..(1) export, (2) express, (3) expense
FA....(1) free astray, (2) freight astray
FB.....Freight Bill
FHWA.....Federal Highway Administration
FMCSR.....Federal Motor Carrier Safety Regulations
FOB.....free on board
frt.....freight
ft.....(1) feet, (2) foot, (3) fort
gal.....gallon
GCW.....gross combination weight
gen'l.....general
gr.....gross
GT.....gross ton
GVW.....gross vehicle weight
hdqrs.....headquarters
hgt.....height
hhd.....hogshead
HP.....horsepower
HQ.....headquarters
ht.....heat or height
ie.....id est (that is)
IB.....(1) inbound, (2)in bond
ICC.....Interstate Commerce Commission
IL.....Interline
imp.....import
inc.....(1) inclusive, (2) incorporated
ins.....insurance
inter.....interstate
intra.....intrastate
inv.....invoice
it.....item
KD.....knocked down
LCF.....low cab forward of engine
LCL.....less than a car load
liq.....(1) liquor, (2) liquid
L&D.....loss and damage
lg tn.....long ton (2,240 lbs)
LPG.....liquified petroleum gas

lt.....long ton
LTL.....less than truckload
max.....maximum
mdse.....merchandise
memo.....memorandum
min.....minimum
MC...(1) minimum charge (2) motor carrier
min wt.....minimum weight
misc.....miscellaneous
MO.....money order
mpg.....miles per gallon
mph.....miles per hour
mty.....empty
N B .....northbound
no.....number
nos.....numbers
nstd.....nested
nt.....net ton
ntfy.....notify
O/C.....overcharge
OR.....owner's risk
OS&D.....over short and damaged
OTR.....over-the-road
oz.....ounce
pcs.....pieces
PD.....property damage
pkg.....package
PL.....public liability
PL&D.public liability and property damage
PP.....(1) prepay (2) prepaid
PSC.....Public Service Commission
psi.....pounds per square inch
pt.....(1) point (2) pint (3) port
PTCA.....Private Truck Council of America
PU.....pick up
PUC.....Public Utilities Commission
PU&D.....pick up and delivery
qt.....(1) quart (2) quantity
R/C.....reconsignment
refrig.....(1) refrigerator
(2) refrigeration
reg.....regulations
rel.....released
rep.....(1) report (2) representative
rpm.....revolutions per minute
rte.....route
SB.....southbound
shtg.....shortage
sh tn.....short ton (2,000 lbs)
SL&C.....shipper's load and count
SO.....shipping order
SR.....shipping receipt
st.....short ton
sta.....station
SU.....set up
SC..... surcharge
term.....terminal
terr.....territory
tfr.....transfer
TL.....Truck Load
tn..... ton(s)
tnge.....tonnage
tot.....total
trans.....transportation
UC.....undercharge
val.....value
viz.....namely
vol.....volume
wdt.....width
WB.....westbound
whse.....warehouse
wt.....weight
yr.....year